

PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME 56

1943

WASHINGTON
PRINTED FOR THE SOCIETY

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PUBLICATION NOTE

By a change in the By-Laws of the Biological Society of Washington, effective March 27, 1926, the fiscal year now begins in May, and the officers will henceforth hold office from May to May. This, however, will make no change in the volumes of the Proceedings, which will continue to coincide with the calendar year. In order to furnish desired information, the title page of the current volume and the list of newly elected officers and committees will hereafter be published soon after the annual election in May.

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TABLE OF CONTENTS.

Officers and Committees for 1943.....	iii-iv
Proceedings for 1943.....	v
The Systematic Status of the Races of the Little Big-Eared Bat, <i>Myotis evotis</i> H. Allen, by W. W. Dalquest.....	1-2
Critical Remarks on the Trogons, by W. E. C. Todd.....	3-16
Two New Species of Lichens and New Records for Washington State and North Carolina, by A. W. C. T. Herre.....	17-20
Eight New Mexican Scarab Beetles Collected by the Hoogstraal Expeditions, by L. W. Saylor.....	21-28
New Forms of <i>Anthreptes</i> and <i>Seicercus</i> (Aves) from the Indo- Chinese Sub-region, by H. G. Deignan.....	29-30
A New Genus of Cuban Urocoptid Mollusks, by P. Bartsch.....	31-32
A New Species of Finch from Ecuador, by J. T. Zimmer.....	33-34
On Nine North American Polydesmoid Millipeds, by R. V. Chamberlin.....	35-40
The Molluscan Genus <i>Trochita</i> Schumacher with a Note on <i>Bicatillus</i> Swainson, by H. A. Rehder.....	41-46
Two New Birds from Tropical America, by W. E. C. Todd.....	47-48
A New <i>Hylella</i> from Mexico, by E. H. Taylor.....	49-52
Three New <i>Acanthaceae</i> from Panama, by E. C. Leonard.....	53-56
A Note on Rafinesque's <i>Florula</i> Columbia, by E. L. Little, Jr.....	57-66
A New Red Squirrel from Minnesota, by A. H. Howell.....	67-68
General Notes—	
Some Early Bird-Records for Maryland and the District of Columbia, by H. G. Deignan.....	69
Occurrence of the Hudsonian Godwit in the District of Columbia, by H. G. Deignan.....	70
Two Preoccupied Names of Oriental Birds, by H. G. Deignan..	70-71
Hoyt's Horned Lark on the Eastern Shore, Maryland, by H. G. Deigann.....	71
The European Widgeon near Washington, by E. M. Has- brouck.....	71
Two New Cotton Rats from Florida, by A. H. Howell.....	73-76
Nine New Grasses from Mexico, by J. R. Swallen.....	77-84
New Cones from the Hawaiian Islands, by P. Bartsch and H. A. Rehder.....	85-88
A New Skunk of the Genus <i>Conepatus</i> from Mexico, by E. A. Goldman.....	89-90
Notes on Fishes in the Zoological Museum of Stanford Uni- versity. XI. Two New Genera and Species with Key to the Genera of Gobies with Vomerine Teeth, by A. W. C. T. Herre.....	91-96

Some Records and Descriptions of American Chilopods, by R. V. Chamberlin.....	97-108
The Mexican Snakes of the Genera <i>Sonora</i> and <i>Chionactis</i> with Notes on the Status of other Colubrid Genera, by W. H. Stickel.....	109-128
Revision of the <i>Rorulenta</i> Group of the Scarab Beetle Genus <i>Phyllophaga</i> , by L. W. Saylor.....	129-142
Some Records and Descriptions of American Diplopods, by R. V. Chamberlin.....	143-152
Critical Remarks on the Toucans, by W. E. C. Todd.....	153-162
A New Fox Sparrow from the Northwestern United States, by J. W. Aldrich.....	163-166
General Notes—	
A New Locality Record for Holbrook's Salamander in the District of Columbia Vicinity, by J. A. Fowler.....	167
Another False Map Turtle from the District of Columbia Vicinity, by J. A. Fowler.....	168

LIST OF PLATES.

1. North American Polydesmoid Millipeds, details.....	39
2. " " " " " "	40
3. Radulae and Genitalia of the Genus <i>Trochita</i>	46
4. <i>Rorulenta</i> Group of Genus <i>Phyllophaga</i> , details.....	140
5. " " " " " "	141
6. " " " " " "	142
7. American Diplopods, details.....	150
8. " " " " " "	151

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets from October to May, on the second Saturday of each month, at 8 P. M. All meetings during 1943 were held in room 43 of the United States National Museum.

January 9, 1943—930th Meeting.

President Humphrey in the chair; 69 persons present.

Informal communications: F. Thone, Exhibition of new books of biological interest; H. B. Humphrey, Exhibition of Marie-Victorin's Flore Laurentienne; M. B. Waite, Mention of winter habits of mammals near Washington.

Formal communications: P. Bartsch, A naturalist in the Philippines.

February 13, 1943—931st Meeting.

President Humphrey in the chair; 21 persons present.

Informal communications: F. Thone, Exhibition of new books of biological interest; R. S. Bray, Exhibition of the first American edition of Buffon; M. B. Waite, Notes on mammals and birds near Washington; A. Wetmore, Note on scarcity of winter birds at Plummers Island; H. B. Humphrey Note on belligerency of a mocking bird.

Formal communication: H. A. Borthwick, Photoperiodism in relation to the behavior of plants and animals.

March 13, 1943—932d Meeting.

President Humphrey in the chair; 40 persons present.

New member elected: H. J. Deason.

Informal communications: F. Thone, Exhibition of new books of biological interest; M. B. Waite, Exhibition of speci-

mens of *Buxbaumia aphylla*; F. Thone, Note on progress in dehydration of foods; J. W. Aldrich, Report of the observation of 6 Pileated woodpeckers in Rock Creek Park; R. D. Truitt, Note on nesting of pileated woodpecker in Patuxent Swamp.

Formal communication: H. G. Richards, Circling the Caribbean.

April 10, 1943—933d Meeting.

President Humphrey in the chair; 140 persons present.

New member elected: H. K. Townes.

The deaths of Mary J. Rathbun and Leonhard Stejneger were announced.

Informal communications: D. H. Johnson, Note on proposed new list of mammals of the District of Columbia; R. S. Bray, Exhibition of new books of biological interest; J. S. Wade, Exhibition of new books of biological interest; M. B. Waite, Report of finding two scarce mosses; George Petrides, Note on the pileated woodpecker and on various scarce birds and mammals.

Formal communication: William Vogt, A thousand days with ten million birds.

May 8, 1943—934th Meeting.

SIXTY-FOURTH ANNUAL MEETING

President Humphrey in the chair; 7 persons present.

New members elected: H. J. Cole, Elizabeth C. Lum, J. P. E. Morrison.

The reports of the Recording Secretary, Corresponding Secretary, and Treasurer were read.

The following officers were elected: President, H. B. Humphrey; Vice-Presidents, Frank Thone, L. K. Couch, J. S. Wade, W. L. Schmitt; Recording Secretary, S. F. Blake; Corresponding Secretary, R. S. Bray; Treasurer, F. C. Lincoln; Members of Council, I. N. Hoffman, J. E. Benedict, jr., F. W. Poos, J. W. Aldrich, Malcolm Davis.

October 9, 1943—935th Meeting.

President Humphrey in the chair; 20 persons present.

New member elected: M. G. Vaiden.

Informal communications: J. S. Wade, Exhibition of new books of biological interest; I. N. Hoffman, Exhibition of publications of the Venezuelan Society of Natural History; P. Bartsch, Note on owls observed near Fort Belvoir; H. B. Humphrey, Note on the occurrence of deer and moose in or near Minneapolis; F. C. Lincoln, Note on the abundance of game birds and mammals this year in the United States.

Formal communications: P. Bartsch, Leonhard Stejneger; J. W. Aldrich, Breeding population studies in the Washington, D. C., region.

November 13, 1943—936th Meeting.

President Humphrey in the chair; 40 persons present.

New members elected: G. M. Bond, C. H. Kolb.

Informal communications: F. Thone, Exhibition of new books of biological interest; H. B. Humphrey, Note on spruces browsed by sheep; J. W. Aldrich, Note on an encounter between a parasitic wasp and the larva of a tiger beetle; W. W. Rubey, Note on breeding of the wood duck near the Reservoir; I. N. Hoffman, Note on a mockingbird nest; Mr. Keith, Note on crows' nests in the Dust Bowl area built of masses of wire on old windmill platforms.

Formal communications: Walter Weber, A collecting trip to southern Mexico; F. C. Lincoln, The Patuxent Wildlife Research Refuge.

December 11, 1943—937th Meeting.

President Humphrey in the chair; 40 persons present.

New members elected: Z. P. Metcalf, M. H. Muma, H. B. Owens.

Informal communications: F. Thone, Exhibition of new books on biological subjects; M. B. Waite, Note on damage done to farm products by crows and goldfinches during the past dry summer; R. S. Bray, Exhibition of new books of

biological interest; A. Wetmore, Note on a possible migration route across the Yucatan Channel; Malcolm Davis, Note on change of nesting date of Australian Silver Gull in National Zoological Park; H. B. Humphrey, Note on the naming of a Liberty ship for Hugh M. Smith.

Formal communications: H. K. Townes, A dictionary's misconceptions about entomology; J. A. Fowler, The fauna of caves with particular reference to the vertebrates.

PROCEEDINGS
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THE SYSTEMATIC STATUS OF THE RACES OF THE
LITTLE BIG-EARED BAT *MYOTIS*
EVOTIS H. ALLEN.

BY WALTER W. DALQUEST,

University of California, Museum of Vertebrate Zoology, Berkley.

In 1864 H. Allen described *Vespertilio evotis* as a new species, but as was customary at that period did not designate a type specimen or a type locality ("Monograph of the Bats of North America," Smithsonian Miscellaneous Collection no. 165). The description was based on twelve specimens from six localities in western North America and one specimen from an unknown locality.

In 1897, Gerrit S. Miller, Jr. ("Revision of the North American Bats of the Family Vespertilionidae," North American Fauna 13, p. 78), fixed the type locality at Monterey, California, from which locality came one of the specimens upon which Allen's description was based. In 1928 Gerrit S. Miller, Jr. and Glover M. Allen ("The American Bats of the Genera *Myotis* and *Pizonyx*," U. S. National Museum Bulletin 144, p. 115) recalled that H. Allen, in 1894 ("A Monograph of the Bats of North America," U. S. National Museum Bulletin 43, p. 89), had regarded a bat from Easton, Washington, as "typical *V. evotis* of the (1864) monograph." Three of Allen's original twelve specimens came from Puget Sound. Because Puget Sound is in western Washington, and because Miller and Allen wrongly supposed that Easton lies in the western Washington faunal area, they concluded that Allen's (1894, p. 89) statement "can only be considered as fixing the type locality in western Washington." From this false start they went on to fix the type locality as Puget Sound, and to regard Allen's (1894, p. 89) mention of Easton as invalidating Miller's (1897, p. 78) designation of Monterey, California, as the type locality.

Easton, however, can not be considered the type locality, it seems to me, because none of the specimens on which Allen based the original description came from there. Also, in the faunal sense Easton can not be considered as in western Washington; it is in an entirely different life-zone and faunal area. Easton is at the eastern edge of the Cascade

Mountains, Kittitas County, in an area that is faunally part of eastern Washington. Almost all of the mammals from the area about it are specifically or subspecifically distinct from the mammals of the Puget Sound area, which is faunally representative of western Washington.

Therefore, H. Allen's statement that the specimen from Easton was "typical *V. evotis*," can not be considered as fixing the type locality at Easton, nor, obviously, can it be interpreted as fixing the type locality at Puget Sound. Consequently Miller's action in 1897 in fixing the type locality at Monterey, California, would seem to stand.

Miller and Allen (*ibid.*) distinguished a dark, northern and coastal race of *Myotis evotis* and a paler, southern and inland form. For the latter they revived the subspecific name *chrysonotus* (*Vespertilio chrysonotus* J. A. Allen, 1896, placed in synonymy by Miller in 1897). Since the bat occurring at Monterey is the pale form, the name *chrysonotus* is preoccupied by the name *Myotis evotis evotis*. The dark northwestern coastal form, to which Miller and Allen wrongly applied the name *evotis*, is left without a name. It may be known as:

***Myotis evotis pacificus*, new subspecies.**

Vespertilio evotis H. Allen, Smiths. Misc. Coll. no. 165, p. 48, figs. 42-43, June, 1864 (part specimens from Puget Sound).

Myotis evotis evotis, Miller and Allen, U. S. Nat. Mus. Bull. 144, p. 114, April 14, 1928, part.

Type.—Adult male, skin and skull, number 94173, Mus. Vert. Zool., obtained by John Chattin, 3½ mi. E and 5 mi. N Yacolt, 500 ft., Clark County, Washington, August 3, 1940; original number 620.

Diagnosis.—Total length less than 90 mm.; ear long, when laid forward extending more than 5 mm. past nose; no keel present on calcar of inter-femoral membrane posterior to foot; ears black; upper parts darker than Clay Color of Ridgway (Color Standards and Color Nomenclature, 1912).

Measurements.—The type specimen and four topotypes average: total length, 85 mm.; length of tail, 41 mm.; length of hind foot, 7.4 mm.; length of ear, 19.4 mm.; height of tragus, 10 mm.; and weight, 5.5 grams.

Comparisons.—*Myotis evotis pacificus* differs from *Myotis evotis evotis* so far as I can see only in darker coloration.

Range.—Forested areas of southern British Columbia, western Washington, western Oregon, and the northwestern coastal area of California.

PROCEEDINGS
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CRITICAL REMARKS ON THE TROGONS.

BY W. E. CLYDE TODD.

The Trogons (Family Trogonidae) in the Carnegie Museum have recently been made the subject of critical study, the results of which seem worthy of permanent record. There are 668 specimens, representing 48 species and subspecies, in the collection. By far the larger part of this series comes from South and Middle America, and only a small portion from Africa. The Oriental Region is unrepresented. In the present paper the specimens are listed by species (including subspecies) and localities;¹ in most cases pertinent remarks on range, taxonomy, plumage, etc., follow. Two new subspecies are described, and some changes in the status of certain other forms are proposed. In the determination of the collection I have had the benefit of considerable material for comparison from the American Museum of Natural History, the U. S. National Museum, and the Field Museum of Natural History. To the authorities of these institutions I wish to tender my thanks.

Mr. J. L. Peters (Bulletin Museum Comparative Zoölogy, 69, 1929, 431) decries the splitting up of the genus *Trogon* into four genera, as Ridgway has done. With his views I am in accord, except as regards the *massena-melanurus* group, which I consider is entitled to recognition as *Curucujus* Bonaparte, on the ground of the more strongly serrate bill, the color-pattern, and the other characters cited by Ridgway.

LIST OF SPECIES.

Pharomachrus mocinno costaricensis (Cabanis).

Eight specimens: Escazú, La Estrella de Cartago, and La Honduras, Costa Rica.

¹ Certain locality-names not appearing on current maps will be duly listed in a future paper.

Pharomachrus auriceps auriceps (Gould).

Thirteen specimens: Paramo de Rosas, Venezuela; Las Ventanas, Colombia; Incachaca, Bolivia.^c

So far as I can see, specimens from these several localities are indistinguishable. According to Chapman (Bulletin American Museum of Natural History, 55, 1926, 328) they are all typical *auriceps*.

Pharomachrus pavoninus (Spix).

Twenty-four specimens: Villa Braga, Hyutanahan, Arimã, São Paulo de Olivença, Tonantins, and Caviana, Brazil.

Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 81, 1937, 426) have described the bird of the lower Amazon as a distinct race, *viridiceps*. They must have overlooked our four specimens from Villa Braga, on the Rio Tapajóz; at any rate, they do not list them. Comparing these with the rest of the series, I am unable to verify the characters ascribed to this alleged form, and with the material before me I should certainly not indorse it.

Pharomachrus fulgidus fulgidus (Gould).

Six specimens: La Cumbre de Valencia, San Esteban, El Hacha, Colonia Tovar, Mirasol, and La Elvecia, Venezuela.

Following Hellmayr and von Seilern (Archiv für Naturgeschichte, 78, 1912, 153), I had called these *festatus*; but according to Peters (Auk, 46, 1929, 115) and Wetmore (Proceedings U. S. National Museum, 87, 1939, 208) they are not the same as the Santa Marta birds, and they are entitled to the name *fulgidus* Gould, the identity of which was long uncertain. The upper tail-coverts are greener, with less golden sheen, and are a little shorter than in *festatus*; in the male they project only slightly (16–19 mm.) beyond the tail. I cannot make out the alleged differences in the loreal plumes. Some time ago Hellmayr marked two of our specimens *fulgidus*.

Pharomachrus fulgidus festatus Bangs.

Eight specimens: Valparaiso, El Libano, Sierra Nevada de Santa Marta (6,000 feet), Las Vegas, and Heights of Chirua, Colombia.

Compare my remarks on this form in Annals Carnegie Museum, 14, 1922, 243. According to Peters (*l. c.*), however, it is a race of *fulgidus*—with which dictum I agree after comparing our material. The differences are not striking. The upper tail-coverts in both sexes are longer than in *fulgidus*, and in three adult males project 32, 34, and 39 mm. beyond the tail; they are also more golden, less greenish, in that sex. The general size is a little larger in the present form.

Pharomachrus antisimensis (D'Orbigny).

Twenty-four specimens: Anzoategui and Paramo de Rosas, Venezuela; Las Ventanas, Colombia; Incachaca and Yungas de Cochabamba, Bolivia.

I can find no characters whereby to distinguish Venezuelan specimens from topotypical birds from Bolivia. Two young males in transition dress are dated September 21 and October 3; both come from the latter country.

Curucujus massena (Gould).

Forty specimens: Guapiles, Guacimo, Cuabre, Rio Sicsola, Pozo Azul de Pirris, La Hondura, El Hogar, and Boruca, Costa Rica; San Pedro Sula, Honduras; Manatee Lagoon, Duck Run, Cockscomb Mountains, and Freetown, British Honduras.

Considerable variation, affecting the sheen of the breast and upper-parts, and the markings on the tail, is evident; but locality has nothing to do with it. In young males the tail is tipped with white and its outer web barred with the same color, and the secondaries are edged with buff. The green of the breast is merely indicated. Individuals showing the moult of the remiges bear dates from August to December. A specimen from Boruca, August 8, shows the rectrices in full moult.

Curucujus australis Chapman.

Four specimens: Malagita, Colombia.

I consider the characters of this form to be specific rather than racial. So far as I know *australis* and *massena* do not approximate each other geographically.

Curucujus clathratus (Salvin).

One specimen: Guapiles, Costa Rica.

Carriker (Annals Carnegie Museum, 6, 1910, 563) erroneously lists five specimens of this species in the collection. He mistook four immature specimens of *massena* for *clathratus*.

Curucujus melanurus melanurus (Swainson).

Forty-eight specimens: Buena Vista, Bolivia; Upper Arucaú, Santarem, Villa Braga, Miritituba, Obidos, Hyutanahan, Nova Olinda, Arimã, São Paulo de Olivença, Tonantins, and Manacapurú, Brazil; Tamanoir and Pied Saut, French Guiana.

Variation in the male affects the intensity of red on the abdomen, the vermiculation of the wings, the sheen of the tail, and in particular the width of the white pectoral band. In birds from Bolivia, without exception, this is narrow and even obsolete, but in those from the lower Amazon it is well developed and quite conspicuous. I am satisfied that this is not a matter of the makeup of the skins. The species was described from British Guiana. I have seen no specimens from that country, but birds from French Guiana vary in respect to this character. Two from Rio Purús agree with the Bolivian birds—as do also two from Manacapurú. Two immature examples from the upper Amazon show a rather wide band. If any further subdivision of this species is to be made I think it is the Bolivian birds that would have to be separated.

Curucujus melanurus macrourus (Gould).

Twenty-three specimens: Fundación, Trojas de Cataca, Puerto Zapote, Jaraquiel, Gamarra, Soatata, Murindó, and Quibdó, Colombia.

The width of the white band in males varies considerably; in one young male which is moulting into the adult plumage it is entirely missing.

Trogon bairdi Lawrence.

Seven specimens: Pozo Azúl de Pirris and El Pozo de Terraba, Costa Rica.

Trogon strigilatus strigilatus Linnæus.

Thirty-nine specimens: Pará, Demonty, Cayari Island, Upper Arucaú, Santarem, Villa Braga, Obidos, Nova Olinda, Manacapurú, and Rio Manacapurú, Brazil; Cayenne, Mana, and Pied Saut, French Guiana; Maripa, Rio Mocho, El Llagual, Rio Yuruan, and Santa Lucia, Venezuela; Carenage and Heights of Orepouche, Trinidad.

There is variation in this series, but it is not correlated with locality. One specimen from Trinidad is very pale below, but I lay this to season (August). In fresh plumage the colors are more brilliant than at other times.

Trogon strigilatus chionurus Selater and Salvin.

Eleven specimens: El Tambor, Soatata, Murindó, El Tambo, Andagoya, and Malagita, Colombia.

In this form the gloss of the upperparts is much more purplish, less greenish, than in typical *strigilatus*.

Trogon melanocephalus illætabilis Bangs.

Twelve specimens: Bebedero, Miravalles, and Bagaces, Costa Rica.

Bangs separated the bird of western Costa Rica from the northern bird mainly on the lighter color of the head, throat, and chest—a character which I am unable to confirm in our series. So far as I can see specimens from Costa Rica are just as dark-colored as those from British Honduras, when examples comparable for sex and condition of plumage are used. However, the color of the posterior underparts in the Costa Rican bird is uniformly paler, less orange, than in the northern bird; this difference, as well as the slightly larger size, will serve to validate the race.

Trogon melanocephalus melanocephalus Gould.

Twenty-six specimens: San Pedro Sula, Honduras; Manatee Lagoon, Quamin Creek, All Pines, and Freetown, British Honduras; Tampico, Mexico.

The white spots on the tail vary greatly in size; in worn specimens they have almost wholly disappeared. April and May specimens are in fine fresh plumage.

Trogon citreolus Gould.

Two specimens: Coyuca (Guerrero), Mexico.

Trogon ambiguus ambiguus Gould.

Seven specimens: Escuinapa (Sinaloa), Sal se Puerdes (Jalisco), Guemes (Tamaulipas), Arroyo de la Presa (Tamaulipas), Jacala (Hidalgo), Axtla (San Luis Potosi), and Mesa de Chipinque (Nuevo Leon), Mexico.

A female specimen from Escuinapa may be the *canescens* of Van Rossem (Bulletin Museum Comparative Zoölogy, 77, 1934, 443), since it fits the description of that form. This author calls *elegans* and *ambiguus* conspecies, but as for myself, I am not so sure.

Trogon elegans australis Griscom.

One specimen: Bebedero, Costa Rica.

Should *Curucujus* be merged with *Trogon* this form would have to be re-named, on account of *Curucujus massena australis* Chapman, 1915.

Trogon collaris collaris Vieillot.

Thirty-two specimens: Buena Vista, Bolivia; Villa Braga, Miritituba, Hyutanahan, Nova Olinda, and Caviana, Brazil; Tamanoir and Pied Saut, French Guiana.

Some males are decidedly bronzy above, others are more greenish. In Bolivian specimens the bars on the tail are comparatively narrow, the black ones about equal in width to the white. Although the barring tends to be wider in French Guiana birds, I should range the latter with those from Bolivia, with which they agree in their relatively shorter tails.

Trogon collaris exoptatus Cabanis and Heine.

Thirty-two specimens: Carenage, Trinidad; Las Quiguas, La Cumbre de Valencia, San Esteban, El Hacha, Sierra de Carabobo, Puerto La Cruz, El Limon, Colonia Tovar, Santa Lucia, San Rafael, Mirasol, and La Elvecia, Venezuela.

These agree with each other in having the tail of the male heavily and broadly barred with black and white; the black bars are wider than the white ones. In Bolivian specimens, as already noted, the tail-bars are narrower, and the two colors are about equal in width. French Guiana birds show intermediate tendencies in this respect, but on the whole they are nearer the southern form. There is also a difference in the length of the tail, which is longer in the Venezuelan birds. Moreover, the females of the two respective series differ, since there is more dusky mottling on the tails of the Venezuelan birds. These latter are entitled to the name *exoptatus* of Cabanis and Heine, based on a specimen from Puerto Cabello. Hellmayr and von Seilern (Archiv für Naturgeschichte, 78, 1912, 154) seem to have surmised as much, but they had only one female example at the time.

The sheen of the upperparts and breast varies in adult males from green to golden bronze.

Trogon collaris virginalis Cabanis and Heine.

Five specimens: Heights of Caldas and Bitaco Valley, Colombia.

Males are readily recognizable from those of true *collaris* by the narrower barring and smaller white tips of the rectrices. The rectrices and upperparts in general are bluer than in either *collaris* or *puella*. Females are a little paler than those of either of these forms.

Trogon collaris puella Gould.

Thirteen specimens: Volcano Irazú, Tobósi, Volcano Turrialba, Carrillo, La Hondura, Juan Viñas, and Las Mesas, Costa Rica.

I have come to agree with Griscom (Bulletin Museum Comparative Zoölogy, 69, 1929, 162) that *puella* should stand as a subspecies of *collaris*. Intergradation between them seems to be complete.

Trogon aurantiiventris underwoodi Bangs.

Eight specimens: La Hondura and Miravalles, Costa Rica.

A young male has the secondaries mottled with buff, and the outer rectrices mottled and (toward their tips) barred with black and white. Adult females are much paler below than those of *puella*.

Trogon personatus personatus Gould.

Fifty-two specimens: Las Nubes, Valparaiso, El Libano, Las Taguas, Sierra Nevada de Santa Marta (6,000 feet), San Lorenzo, Las Vegas, Cincinnati, Pueblo Viejo, Heights of Chirua, San Miguel, Las Ventanas, Paramo Guerrero, La Pica, and Vista Nieve, Colombia; Guarico, Paramo de Rosas, Guamito, La Cuchilla, and Tabay, Venezuela.

In general, males from the Eastern Andes have the white bars on the outer rectrices narrower and less prominent than in males from the Santa Marta region, but so many specimens are indistinguishable that no separation would be justified. I can find no constant differences between Colombian and Venezuelan examples.

Chapman (American Museum Novitates No. 96, 1923, 2) describes the female of his *Trogon temperatus* as having white vermiculations on the wing instead of brown. Five of our females from the eastern Andes listed above fit this description, but they are certainly not *temperatus*. They seem to be adult birds, and I do not understand the significance of this variation.

Trogon temperatus temperatus Chapman.

One specimen: La Leonera, Colombia.

Cf. Berlioz, Bulletin Museum d'Histoire Naturelle Paris, (2), 4, 1932, 622. Our specimen agrees closely with others from Colombia in the American Museum of Natural History.

Trogon temperatus submontanus, subsp. nov.

Seventeen specimens: Buena Vista, Cerro Hosáne, Samaipata, Incachaca, and Yungas de Cochabamba, Bolivia.

Type, No. 80,790, Collection Carnegie Museum, adult male; Samai-pata, Bolivia, November 20, 1919; José Steinbach.

Subspecific characters.—Similar to *Trogon temperatus temperatus* Chapman of the Colombian Andes, but bill averaging stouter; general coloration of male lighter; and upperparts and breast of female duller brown. Wing (type), 128 mm., tail, 130; exposed culmen 18; tarsus, 14.

Range.—Foothills and middle elevations of the Andes of Bolivia.

Remarks.—In Bolivian males of this Trogon the upperparts and breast are greener than in those of true *temperatus* from Colombia (seven specimens); the bluish sheen, which is prominent on the crown and rump of Colombian birds, is much reduced, and in some examples is replaced by bronzy; the whole color effect is lighter. Females have the upperparts and breast duller brown; in all those examined the vermiculations on the wing-coverts are buffy and dusky, instead of black and white. Chapman (Bulletin American Museum of Natural History, 55, 1926, 331) notes that a female Trogon from Incachaca resembles *personatus*, whereas a male has a tail like that of *temperatus*—precisely as in our specimens. As a rule, however, females of *temperatus* have the markings on the outer rectrices coarser than in *personatus*, but some examples would scarcely be distinguishable on this score.

I have carefully read the original descriptions of *Trogon propinquus* Cabanis and Heine and of *T. heliothrix* von Tschudi, and I do not see how they could possibly apply to the present bird. It is true that there is some variation in the extent and prominence of the light barring on the outer rectrices of the male; it is obsolete in some birds, but well marked in immature examples.

It is interesting to note that although the species *temperatus* is a bird of the Temperate Zone in Colombia and Ecuador, it descends to lower levels in Bolivia.

Trogon rufus rufus Gmelin.

Fifteen specimens: Upper Arucauá and Obidos, Brazil; Tamanoir and Pied Saut, French Guiana; Rio Mocho, Venezuela.

I unhesitatingly reject *curucui* of Linnaeus for this species (cf. Zimmer, Field Museum Zoological Series, 17, 1930, 295-6, and Schneider, Journal für Ornithologie, 86, 1938, 91) and instead use the next available name. Thus I disagree with Ridgway's conclusion, and I think Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 88, 1941, 180) have adopted his views without full consideration.

Cayenne is the type-locality. Unfortunately we have no specimens from there, but only from localities to the west and the south. Birds from the Oyapock River tend toward the lower Amazonian race. I have also studied in this connection eight males and three females from British and Dutch Guiana (American Museum). In the males the color of the median rectrices varies. In one or two they are almost as bronzy as in birds from the lower Amazon, but in others they tend toward bluish, as in our Tamanoir birds.

Trogon rufus sulphureus Spix.

Nine specimens: Hyutanahan, Tonantins, and Manacapurú, Brazil.

The *Trogon sulphureus* of Spix (Aves Brasiliæ, 1, 1824-26, 48, pl. 38) was based on two specimens, supposed to be a pair, from Tabatinga, on the upper Amazon. The left-hand figure (fig. 2), supposed to represent the female, is actually referable to the *Trogon violaceus* of Gmelin. The figure of the male is a very poor representation of the Trogon which has usually been called *Trogon atricollis* Vieillot. The green of the upperparts and breast in the plate is a motmot green—not at all like the shining color of the real bird—but this must be laid to the inadequate methods of reproduction in that early day. Hellmayr, who has studied the type-specimen itself (cf. Abhandlungen K. K. Bayerischen Akademie Wissenschaften, II Kl., 22, 1906, 596), says that it is practically identical with a specimen in the Tring Museum from the River Carimang, British Guiana. He therefore proceeds to resolve *sulphureus* as a synonym of *atricollis* Vieillot (= *rufus* Gmelin).

Now, we have one male each from Hyutanahan (on the Rio Purús) and Tonantins (on the Rio Solimoes east of Tabatinga), which differ markedly from French Guiana specimens of *rufus* in having the upperparts strongly suffused with bronzy and the median rectrices strongly coppery bronze (except towards their black tips). They fit the description of *Aganus devillei* Cabanis and Heine (Museum Heineanum, 5, 1863, 191) from Santa Maria, upper Amazon, with which form Zimmer (Field Museum Zoological Series, 17, 1930, 294) identifies his specimens from Puerto Bermudez, eastern Peru. On geographical grounds it is inconceivable that the *Trogon rufus* population of Tabatinga would be different from that of localities on the east and west. Indeed, Spix describes the median rectrices of his bird as "cupreo-relucente" and "cupreo-chalybeo," and the upperparts as "aureo-viridi"—words which perfectly describe our specimens also. Moreover, the female is characterized by a marked reduction in the width and number of the black bars in the lateral rectrices; so that the effect in general is whiter.

I have handled the two specimens from Puerto Bermudez, Peru, listed by Zimmer. The adult resembles our Amazonian specimens in the color of the tail, but the yellow of the underparts is richer and more orange. This is probably due to the fresher condition of the specimen. There is no sign of a white post-pectoral band. I have also examined two specimens from the River Carimang in the American Museum (Rothschild Collection), and I have found them indistinguishable from true *rufus*, just as Hellmayr claims. On the basis of the type-specimen alone, therefore, he was perfectly justified in considering Spix's *sulphureus* a synonym of *rufus*. But if we accept as correct the ascribed locality Tabatinga, in connection with the color-description already noted, a different conclusion ensues. Spix's type-specimen and plate simply do not fit his description and locality. Either the colors of both the specimen and plate have altered, or (what is more likely) there has been some mistake involving the identity of the type itself. Which of these

considerations should have the greatest weight in fixing the name *sulphureus* is an open question; I am decidedly of the opinion, however, that in this case the description and locality are paramount, and I therefore accept the name for the bird of the upper Amazon. The specimen from La Morelia, in the Caquetá region of Colombia, which Chapman lists (Bulletin American Museum of Natural History, 36, 1917, 315) evidently belongs to this well-marked race and serves to extend its range considerably farther north. The two birds (a pair) from Manacapurú in our collection are referred here provisionally; they are really intermediates between *sulphureus* and the lower Amazonian race, which I call

***Trogon rufus amazonicus*, subsp. nov.**

Eight specimens: Benevides, Santarem, Villa Braga, and Apacy, Brazil.

Type, No. 75,244, Collection Carnegie Museum, adult male; Villa Braga, Rio Tapajoz, Brazil, December 1, 1919; Samuel M. Klages.

Subspecific characters.—Similar to *Trogon rufus rufus* Gmelin of the Guianas, but median rectrices of tail (in male) glossed with bronze, instead of green or blue, as in the nominate form. Adult female not certainly distinguishable from the latter, but with a tendency toward narrower black bars on the tail.

Range.—Lower Amazonia.

Remarks.—Griscom and Greenway (Bulletin Museum Comparative Zoology, 88, 1941, 80) refer these specimens to *sulphureus* of Spix. As I have tried to show under the head of that form, Spix's name must be taken for the bird of the upper Amazon to which the name *devillei* was later applied by Cabanis and Heine. Since the lower Amazon bird is recognizably different both from that of Guiana (true *rufus*) and from that of southern Brazil (*chrysochlorus*), and is thus left without a name, it will have to be christened. Griscom and Greenway could find no differences between males from Surinam and those from the lower Amazon and based their separation wholly on the characters shown by the females. These alleged differences I am unable to confirm upon comparison of a series (three each from the lower Amazon and French Guiana, one from Surinam, and two from British Guiana). The sheen of the tail in the male, however, although it naturally varies somewhat, is still sufficiently constant to justify the separation I here propose.

***Trogon rufus cupreicauda* (Chapman).**

Four specimens: El Tambor, Malagita, and Cordoba, Colombia.

These must be this race on geographical grounds. But I would not describe the tails of the males as "rich copper-bronze" as does Chapman, but rather as bronzy green. Females differ markedly from the same sex of all other forms of *Trogon rufus* in having the outer rectrices rufous chestnut except for the white tips; most of the light barring on both webs is of this color. Indeed, the characters of this form, taken in con-

nection with its outlying range, go far to suggest that it is a distinct species. It is cut off by the Andes from *rufus*, and toward the north it appears to maintain its characters where its range approaches that of *tenellus*.

Trogon rufus tenellus Cabanis.

Twenty specimens: Volcano Turrialba, Cuabre, Rio Sicsola, Pozo Azul de Pirris, El Hogar, Miravalles, and El Pozo de Terraba, Costa Rica; Soatátá, Colombia.

In addition to the above I have handled 24 males from Nicaragua, Costa Rica, and Panama (American Museum; U. S. National Museum). In some the median rectrices have a rich blue sheen; in others they are green. However, this variation has no geographical significance, and in some cases both types occur together. Specimens taken in August, September, and October show prenuptial moult.

Of two males from Soatátá, on the lower Atrato, one has a greenish tail; the other, more bluish. Thus these specimens show no approach towards *cupreicauda* of western Colombia, which form Chapman records from Alto Bonito, a locality not far distant. Griseom notes the same circumstance with reference to birds from eastern Panama (Bulletin Museum Comparative Zoölogy, 72, 1932, 338). So far as known there is no direct geographical connection between *rufus* and *tenellus*, although their respective characters would suggest conspecific relationship. No form of this group is known from Venezuela, and *tenellus* and *cupreicauda* behave like distinct species where their ranges approximate. Both from a taxonomic and distributional standpoint, this is a most interesting case.

Trogon violaceus ramonianus Deville and Des Murs.

Seven specimens: Benevides, Colonia do Mojuy, Apacy, Hyutanahan, and Arimã, Brazil.

Females of this form are indistinguishable from those of true *violaceus*, but the males have the wing-coverts and secondaries with little or no light vermiculation; they appear "solid" black except on close inspection. The Benevides male is precisely like those from the Rio Purús, although Ridgway (Bulletin U. S. National Museum No. 50, 5, 1911, 786) even went so far as to give a provisional name to the bird of the lower Amazon. Hellmayr (Novitates Zoologicae, 17, 1910, 387) also remarks that birds from the lower Amazon (Rio Xingu) are identical with those from Peru. He was puzzled, however, by the occurrence of a bird which he identified as true *violaceus* on the Rio Madeira.

Trogon violaceus violaceus Gmelin.

Nine specimens: Cayenne, Tamanoir, and Pied Saut, French Guiana; Demonty, Brazil.

Cayenne birds (one male; two females) are a little smaller and paler than the others. They appear to have the dark color of the breast more

restricted and the white below it more in evidence; but since adult males from either side (Tamanoir and Demonty) are alike, I take it that this variation is not geographical.

Gmelin's name *violaceus* is based on Koelreuter, whose description I have been able to consult; it is perfectly pertinent. Von Berlepsch and Hartert (Novitates Zoologicae, 9, 1902, 106) fix Surinam as the type-locality.

Trogon violaceus caligatus Gould.

Eighteen specimens: Bonda, Cincinnati, Fundación, Jaraquiel, and El Tambor, Colombia; Sabana de Mendoza and Guachi, Venezuela.

Compare my remarks in Annals Carnegie Museum, 14, 1922, 241, under *columbianus*. Since then Peters (Bulletin Museum Comparative Zoölogy, 69, 1929, 432-4) has conclusively shown that Gould's name *caligatus* is in fact applicable to the Colombian race of this species; this leaves *columbianus* Chapman as a synonym. I follow Peters also in making *caligatus* and *violaceus* conspecific. From *ramonianus* through *violaceus* to *caligatus* there seems to be an unbroken chain of characters.

The Venezuelan records are the first for the Maracaibo Basin, and they show that this species, in common with certain others heretofore supposed to be peculiar to the Magdalena Valley, crosses the Eastern Andes. I am by no means sure, however, that these Venezuelan specimens and those from El Tambor are the same as the Santa Marta series. They average more richly colored, sex for sex; the yellow below is deeper, more orange in tone; moreover, they average smaller. But since most of our Santa Marta birds are in worn and probably faded plumage, I cannot be sure how fresh birds would compare. It may be noted that El Tambor is near the type-locality of Chapman's *columbianus*.

Trogon violaceus concinnus Lawrence.

Twenty-eight specimens: Cascajal, Panama; Juan Viñas, Pozo Azul de Pirris, Guapiles, Guacimo, Rio Sicsola, El Hogar, Bebedero, Miravalles, Esparta, Boruca, and Buenos Aires, Costa Rica.

That the coarser barring on the wing-coverts and secondaries, characteristic of the immature plumage in males, persists through the first breeding season is indicated by worn specimens dated March 21 and April 8. Adults seem to moult in July and August, and a female taken September 12 is just completing the moult of the wings. Some females are very pale below.

Trogon violaceus sallæi Bonaparte.

Five specimens: San Pedro Sula, Honduras; Escuintla, Guatemala; El Cayo and Freetown, British Honduras; Axtla (San Luis Potosi), Mexico.

Although Ridgway's measurements show a considerable difference in size between northern and southern specimens of this species from Central America, he did not venture to subdivide it. Peters (Bulletin

Museum Comparative Zoölogy, 69, 1929, 434) calls the northern bird *braccata* (Cabanis and Heine), but more recently Van Rossem (Bulletin Museum Comparative Zoölogy, 77, 1934, 392) has reached the conclusion that Bonaparte's name *sallæi* is both pertinent and earlier. After studying Bonaparte's description I agree. Carriker and de Schauensee (Proceedings Academy Natural Sciences Philadelphia, 87, 1935, 434) are doubtful of this allocation, but if the locality Bonaparte cites (Orizaba, Vera Cruz) is correct, the description could scarcely apply to any other species.

Trogon curucui behni Gould.

Thirty-five specimens: Puerto Suarez, Santa Cruz de la Sierra, Curiche, Buena Vista, Yacuiva, Cerro Hosáne, and Bermejo, Bolivia; Rio Bermejo, Argentina.

In naming these subspecifically I follow Hellmayr, Field Museum Zoological Series, 12, 1929, 422. I have not seen the nominate race, usually called *variegatus*. Schneider (Journal für Ornithologie, 86, 1938, 91) insists that this species is the *Trogon curucui* of Linnæus, which he claims was based mainly on an oil painting by Marcgrave. This finding serves to confirm Zimmer's earlier surmise (Field Museum Zoological Series, 17, 1930, 295-296), and since three of the references cited by Linnæus are clearly referable to the present bird we shall have to accept *curucui* as its proper name. I follow Mr. Peters (in *litt.*) in this case, and Mr. Zimmer also agrees.

Trogon bolivianus Ogilvie-Grant.

Five specimens: Apacy, Hyutanahan, Tonantins, and Manacapurú, Brazil.

These fit the original description and plate and agree with Hellmayr's comparative diagnosis (Field Museum Zoological Series, 12, 1929, 423). I follow Chapman, however (Bulletin American Museum of Natural History 36, 1917, 316), in considering *bolivianus* specifically distinct. As Hellmayr has remarked, the name was given in spite of the fact that no specimens from Bolivia were listed at the time, and none are yet known.

Apaloderma æquatoriale Sharpe.

Eleven specimens: Lolodorf, Akok, Sakbayeme, and Efulen, Cameroun.

Apaloderma narina littorale van Someren.

Two specimens: Mombasa, Kenya Colony.

Apaloderma narina narina (Stephens).

Five specimens: Mount Selinda, Southern Rhodesia; Chikonje and Ruo, Nyasaland.

Apaloderma narina brachyurum Chapin.

Two specimens: Efulen, Cameroun.

Heterotrogon vittatus vittatus (Shelley).

Two specimens: Cholo, Nyasaland.

Heterotrogon vittatus camerunensis Reichenow.

Three specimens: Buea and Nkongsamba, Cameroun; Mount Moco, Angola.

The Mount Moco specimen is intermediate between this race and true *vittatus* (cf. Chapin, Bulletin American Museum of Natural History, 75, 1939, 486).

Temnotrogon roseigaster (Vieillot).

Two specimens: Rivier Bar, Haiti; Loma del Rio Grande, Dominican Republic.

Priotelus temnurus temnurus (Temminck).

Two specimens: Guantanamo, Cuba.

Priotelus temnurus vescus Bangs and Zappey.

Twelve specimens: Nueva Gerona, Hato, and Los Indios, Isle of Pines.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW SPECIES OF LICHENS AND NEW
RECORDS for WASHINGTON STATE
and NORTH CAROLINA.

BY ALBERT W. C. T. HERRE.

In 1917 I published a paper under the title "Preliminary Notes on the Lichens of Whatcom County, Washington", in which 125 species were listed, together with brief notes on them. At that time a considerable number of specimens had been laid aside until comparison could be made with other material, or until the literature could be further consulted. In working up these specimens, and in studying some collections obtained in the last few years, additions have been made to the known lichen flora of Whatcom county and these are herewith presented. It is evident that the lichen flora of this north-western corner of our country is only partially known. Any intensive collecting at high altitudes on the ice-clad peaks of Whatcom County would add greatly to the number of species known. The lowlands of the western half of the county have been so devastated by the combined efforts of lumberman and farmer that some of their characteristic lichens are practically extinct, but the eastern half of the county is still almost untouched and would give a rich harvest of rare and little known species. The 19 plants here listed, added to the 125 previously published, make a total of 144 lichens definitely known to occur in Whatcom County. This number is certainly less than half of those which occur within the limits of the county. Those of us who have collected and studied the flowering plants of Whatcom County know that it has a rich and varied flora, but few realize that its lichen flora is equally abundant and diversified.

1. *Staurothele glacialis* Herre, sp. nov.

Thallus effusus tenuis uniformis laevigatus e pallido ad fuscisente umbrinus, substratum arcte obducens. Apothecia parvula, dispersa, .1-.3 lata, sessilia, nigra, sub-globosa, ad basin non constricta, ostiolo punctiformis; gonidia hymenalia crebra, oblonga et subglobosa, parva, pallide viridia; asci oblongo-clavati; sporae binae, primum decolores, postremum fuscae, oblongo-ellipsoideae, murales, cellulis in seriebus superpositus 4-8, in seriebus horizontalibus 2-3, 9.3-14 μ latae et 21.7-31 μ longae; hymenium caeruleum cum I.

Ad saxa vulcanica prominentia ex glaciis, 7,000 ped. supra-mare; Mt. Baker, Whatcom County, Washington.

The thin smooth uniform and effuse thallus is pale brownish clay to dark umber, and firmly adherent to the substratum. The minute to very small sessile subglobose apothecia are .1 to .3 mm. in diameter, not basally constricted, the dot-like ostiole barely evident. The abundant minute hymenial gonidia are pale greenish; the asci are oblong clavate, with 2 spores which are at first colorless, becoming dark brown. The spores are 3-7 septate transversely, and 2 or irregularly 3 septate longitudinally, 9.3-14 μ wide and 21.7-31 μ long. The hymenium is blue with I.

Occurring on lava rocks at 7,000 feet altitude, projecting from the ice cap of Mt. Baker, Whatcom County, Washington.

2. *Biatorella Kulshanensis* Herre, sp. nov.

Thallus epilithicus, crustaceus, uniformis, laevigatus, bene evolutus, sat tenuis, substrato arcte adherens, areolatus, rimulosus (areolae minores, irregulares), marginum plus minus lobulatae, sorediis et isidiis non praeditus, albido-cinereus et atro-cinereus demum nigrescens, in ambitu bene limitatus, hypothallus ater bene evolutus; KOH-; CaCl_2O_2 -; medulla alba, I-.

Apothecia lecideina, nigra, parva, innata, primum depressa demum plana et parum convexulam, .4-.8 mm. lata, nigricans, opaca, epruinosa; margo cum disco concolore, tenuis, mox evanescens; epithecium nigro-virescens, 24-30 μ altum; hypothecium crassum, decolor, 90-120 mm. altum; hymenium decolor, I caeruleum; paraphyses filiformes, simplices, eseptatae, laxiuscule contextae; asci crebri, oblongi-clavati, myriospori, 18-22 μ latae et 55-68 μ longae; sporae decolores, simplices, sub-globosae ad oblongae, 1-1.5 μ latae et 2-3.5 μ longae.

Ad saxa vulcanica, 7,500 ped. supra mare, Mt. Baker, Whatcom County, Washington.

The well developed smooth thin thallus is whitish gray and darkening, becoming black, areolate, rimose, firmly adherent to the substratum, the areolae small; some of the areolae are elongate and minutely lobulate at the margin, which is marked by a black hypothallus; no soredia or isidia; no chemical reactions.

Apothecia lecideine, black, very small, .4-.8 mm. wide, innate to very

slightly emergent; plane to very little convex, the thin black proper margin soon disappearing; the dark green epithecium is 24–30 mm. high; the wide colorless hypothecium is 90–120 mm. broad; the numerous asci are broadly club-shaped, 18–22 by 55–68 μ ; the hyaline hymenium is blue with I; the paraphyses are simple, slender, without septae, lax and twining; the subglobose to oblong ellipsoid spores are 1–1.5 by 2–3.5 μ .

Only a fragment of this lichen was secured from a lava pinnacle projecting above the ice-cap on Mt. Baker, at 7,500 feet. The plant has the aspect of a *Buellia* or *Lecidea*.

Kulshan was the native name of the glacier-clad volcano called Mt. Baker on our maps.

3. *Arthopyrenia analeptella* (Nyl.) Arnold

At 6,000 feet, on Heliotrope Ridge, Mt. Baker.

4. *Chaenotheca phaeocephala* (Turner) Th. Fries

On dead and rotting conifers, Chuckanut Mt.

5. *Solorina saccata* (L.) Ach.

On earth at the foot of rocks projecting above the ice cap, at 7,000 feet, Mt. Baker.

6. *Lecidea elata* Schaerer

On Skyline Ridge, Mt. Baker, at about 7,000 feet. This is the *Lecidea amylacea* (Ach.) Tuck. of Fink's Manual.

7. *Lecidea fusco-rubens* Nyl.

Mt. Baker, at 6,500 feet. Spores 5.5–7.75 by 12.4–18.6 mikrons.

8. *Lecidea granulosa* (Ehrht.) Ach.

at 7,500 feet, on earth, Mt. Baker, Skyline Ridge. Thallus red with KOH; hypothecium colorless to pale yellow. Apothecia reddish brown to black.

9. *Lecidea myriocarpella* (Merrill) A. Zahlbr.

Formerly abundant on old bridges and bridge timbers at Bellingham. In recent years all the old bridges and trestles so conspicuous at Bellingham have been replaced by concrete, or eliminated altogether.

10. *Lecidea pantherina* (Hoff.) Ach.

At 7,000 feet on Skyline Ridge, Mt. Baker. Thallus yellow, then blood red with KOH, and exactly like specimens I collected in Styria. Spores 5 to 6 by 9 to 12 mikrons.

11. *Lecidea speira* Ach.

At 6,000 feet, Heliotrope Ridge, Mt. Baker.

12. *Lecidea vulgata* A. Zahlbr. f. *granulosa* A. Zahlbr.

(*Lecidea goniophila* f. *granulosa* Jatta).

Mt. Baker, at 6,000 and 7,000 feet. Thallus without chemical reactions. Hypothecium colorless; epithecium thick, purplish dusky, the color often extending downward through the hypothecium; paraphyses more or less conglutinate; thecium deep blue with I; spores 4 to 8 in the asci, 9 to 14 by 14 to 22 mikrons. The specimens would be considered a new species by many.

13. *Rhizocarpon ambiguum* (Schaerer) A. Zahlbr.
Mt. Baker, at 7,500 feet. Spores bilocular, constricted at the middle, 10.5 to 13 by 21 to 28 mikrons.
14. *Gyrophora vellea* (L.) Ach.
Heliotrope Ridge, Mt. Baker, at 6,000 feet. Specimens small, rather depauperate and off color, exactly like those I collected in the Austrian Alps and specimens sent me by Dr. Edward Frey which he collected in Switzerland.
15. *Acarospora rufescens* (Sm.) Bausch
Of general occurrence in the mountains.
16. *Lecanora calcarea* (L.) Sommerf.
Mt. Baker, at 6,000 feet. Spores globose to ellipsoid, 9.5 to 14 mikrons broad by 14 to 22 long.
17. *Lecanora laevata* Nyl.
Mt. Baker, at 6,000 feet.
18. *Lecanora polytropa* (Ehrh.) Rabenh.
Mt. Baker, on Skyline Ridge at 6,500 feet, and on rocks projecting from the ice cap above Heliotrope Ridge, at 7,000 feet.
19. *Buellia colludens* (Nyl.) Arnold.
Mt. Baker, at 7,500 feet.

At Russell Lake, Pacific County, Washington, I collected the following:

At Russell Lake, Pacific County, Washington, I collected the following: *Graphina anguina* (Mont.) Müll Arg.

Spores 9 to 21 mikrons broad by 35.5 to 52.7 mikrons long. This species does not seem to have been reported previously from North America.

From Dr. P. O. Schallert, of Winston-Salem, I received for determination a small and wretched specimen occurring on bark in Forsyth County, N. C. It is *Lecanora anoptiza* Nylander. Spores globose to sub-globose, 6 to 8 mikrons in diameter. Thallus uniform, brownish gray; apothecia purplish brown, the margin becoming crenate and the apothecia finally lobulate. This obscure lichen of the *Lecanora subfusca* group has not hitherto been reported from the United States.

From my friend C. L. Brown, of Larkspur, Marin County, California, additional examples of *Lecanora anoptiza* Nyl. were received. One was from Muir Woods, the other near Mill Valley. Thallus dark, more or less greenish gray; apothecia brown; paraphyses with enlarged brown or pale umber tips, often branched or bifurcate; thecium vivid blue with I.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

EIGHT NEW MEXICAN SCARAB BEETLES
COLLECTED BY THE HOOGSTRAAL
EXPEDITIONS.

BY LAWRENCE W. SAYLOR, *Washington, D. C.*

I am much indebted to Harry Hoogstraal of the University of Illinois for the privilege of examining and describing the present material. The insects of this group are very abundant in neotropical regions and it appears that but a small percentage of the species have been described, and many of the latter are known only from one sex.

Phyllophaga (Phytalus) hoogstraali, new species.

Male: Oblong-ovate, wider behind. Color piceo-rufous and strongly pruinose dorsally; superficially glabrous above except for a few short and erect frontal hairs, though in reality the thorax and elytra with extremely minute hairs. Clypeus moderately long, the apex slightly reflexed and the middle slightly and narrowly emarginate, the angles broadly rounded; disc with dense, regularly-placed, non-contiguous punctures of moderate size. Front punctured as clypeus though the punctures are somewhat contiguous and larger bordering the eyes; fronto-clypeal suture strongly biarcuate. Antenna 10-segmented, rufous, segments 3-5 short; club subequal to funicle. Thorax strongly transverse, the sides evenly arcuately dilated and coarsely crenate and ciliate, the angles noticeable but obtuse; base completely margined though weakly so at middle; disc densely and regularly umbilicately punctate, the moderately-sized punctures separated by once to twice their diameters, a small and irregular median discal area impunctate. Scutellum densely punctured. Elytra punctured as thorax but more sparsely so; sutural and one discal striae obvious, the latter strongly widened apically. Pygidium convex, and somewhat narrowly apically, the apical and ciliate margin thickened and subtruncate; disc polished, densely and regularly punctate and with suberect hairs. Abdomen flattened at middle and polished, pruinose laterally; 5th segment large, plane, and sparsely and setigerously punctate 6th segment half length of fifth, densely and not coarsely punctate,

slightly convex basally and with a narrow transverse sulcus bordering the ciliate apical margin. Hind tibia with one spur fixed, curved, very short and nearly as wide as long; the free spur is nearly three times longer, flattened and suddenly narrowed apically beyond the middle. First segment hind tarsus slightly shorter than second. Claws very narrowly and deeply cleft, and the two parts of nearly equal length and width, the lower tooth at times a little broader; base hardly dilated. First segment of front tarsus elongate, with a short, acute tooth at the inner apex; second segment with a large, broad, flattened, bluntly obtuse and slightly curved lobe on the inner apex; third and fourth segments with a very short, inner, apical spine. Upper face of the front tibia rather densely punctured.

Female: Similar to male except as follows: Hair on elytra a little more obvious. Antennal club equal to segments 3-7 in length. First, third and fourth front tarsal segments with a faint inner apical spine; second segment with a rather obvious inner spine which is shorter and much more narrow than in male. Pygidium more convex and the abdomen likewise, the 6th sternite a little more convex. Hind spurs free, flattened and broad. Length 17-20 mm. Width 9.5 mm-11 mm.

The Holotype male, Allotype female and three paratype males, all in the Saylor Collection are from: "West of Apatzingan 3 miles, Michoacan, Mexico, August 13-15, 1941, 1,200 ft. elev., collected at light by Hoogstraal & Haag."

This species resembles *P. pruinosa* Blanchard except that, externally, the dorsal puncturation is different and the front tarsal projection is lacking in the latter; also, the male genitalia are very near those of *pruinosa* in most characters but in lateral view are less curved. From *P. tegenara* Saylor, *hoogstraali* may be separated by the much shorter fixed spur of the hind tibia. Named for my good friend Harry Hoogstraal, who by his careful collecting is doing much to make this difficult group of insects better known to science.

Phyllophaga (*Phytalus*) *minutissima*, new species.

Male. Elongate, very small; color rufocastaneous; shining; entire dorsal surface with very short, erect hair of uniform length. Clypeus very short and transverse, the apex reflexed and narrowly and distinctly emarginate at middle, the angles broadly rounded; disc with coarse, sparse and regularly placed punctures. Front with dense, coarse, variolate punctures. Eyes very large (width of each eye equal to about four-tenths the distance between the eyes). Antenna testaceous, unicolorous, and 9-segmented; segments 3-5 successively longer but each subglobose 6th minute; club subequal to funicle. Thorax transverse, sides roundly evenly dilated at middle, the margins entire and with fine short cilia, the angles obtusely rounded; basal and apical margins both faintly bisinuate; disc with coarse, dense, regular punctures separated by once or more their diameters, though somewhat closer at sides. Scutellum with a few coarse punctures over the entire surface. Elytron with very dense,

somewhat coarse punctures, the surface rugose and the striae obvious. Pygidium dull, faintly convex, the disc extremely densely and coarsely punctate and with short erect hairs; the apex narrowed and subrounded. Abdomen widely flattened, and sparsely, finely, setigerously punctate; 5th sternite densely punctured over nearly its entire surface; 6th two-thirds the length of fifth and densely setigerously punctured. First segment hind tarsus much shorter than second; spurs free, graceful and nearly subequal in length. Claws narrowly cleft, the upper tooth slightly shorter and a very little wider than the apical; base slightly dilated. Length 6.7 mm. Width 3.3 mm.

The unique male Holotype in the Saylor Collection is from: "Pedregal, near Tancitaro, Michoacan, Mexico, swept from flowers, 6,000 feet elevation, June 27, 1941, Traub Collector." This species is near *P. poculifer* Bates, but has 9-segmented rather than 8-segmented antennae and the head and thorax do not have long hair. From *P. temascaltepeca* Saylor, the new species differs in the smaller and more elongate size, and the allied but quite different type of male genitalia.

Phyllophaga (Phytalus) tancitara, new species.

Male: Oblong-ovate; shining above, and disc of thorax and elytra apparently glabrous. Color testaceo-piceous, the elytra usually testaceous and the thorax usually irregularly castaneous with wide lateral testaceous area; the color varies to nearly entirely castaneous in the female and the male elytra are at times castaneous. Clypeus of moderate length and deeply concave, the apex reflexed, slightly rounded, highest at middle and not emarginate, the angles narrowly rounded; disc coarsely and rugosely punctate. Front flat and very coarsely and densely punctate, with long erect pile; vertex impunctate. Antenna 9-segmented, at times 8-segmented; color testaceo-castaneous, the club darker; segments 3 and 4 very long, about 3 times the length of the 2nd, or even longer, the 5th (or 6th) very short and transverse; club long and graceful subequal to length of the entire stem. Thorax dilated in front of the middle, sides straight and nearly parallel, crenate, and with long cilia, the angles obtuse; front margin with a row of very long cilia; disc irregularly punctured with sparse and fine punctures, these separated by one to three times their diameters at the middle disc and more sparse at the sides. Scutellum with several small punctures at the sides. Elytra finely and very rugosely punctured, sutural stria flat and weakly indicated. Pygidium polished and convex, finely and regularly punctate, the punctures with short suberect hairs and separated by two to three times their diameters. Abdomen polished, flattened, very sparsely and finely setigerously punctate at middle, the 5th segment plane and a little more densely punctured medially; 6th segment two-thirds the length of the 5th and a little more coarsely punctured than the latter. Front tibia with the third (upper) tooth weak but obvious. Claws cleft, the lower tooth much shorter than, and somewhat wider than, the long and slender apical tooth; the base is slightly dilated. Hind tibial spurs free and graceful; first segment hind tarsus slightly shorter than the second.

Genitalia exactly as in *platti* Saylor; the male genitalia are also very similar to those of *B. aegrota* Bates but differ as follows: they are less rounded above in lateral view, and in enface view the apices of the lateral lobes are more strongly convergent, rather than subparallel.

Female: Similar to male except as follows: the color is more unicolorous castaneous; the clypeus is shorter and much less concave and less reflexed; the front is more sparsely punctured; the pygidium is more narrowed apically and is strongly, transversely tumid in the basal third; the abdomen is more convex; the antenna is usually 9-segmented, and segments 3-5 are elongate but only once to twice the length of the second, and the club is equal in length to segments 3-6 of the funicle; and the claw is very widely cleft (and in fact is practically a *Phyllophaga* sensu str. type of claw). Length 9.2 mm. to 12 mm. Width 4.5 mm-5.3 mm.

The Holotype male, Allotype female, and 10 paratypes in the Saylor Collection, are from "Cerro Tancitaro, Michoacan, Mexico, 7800-10,500 ft. elevation, at light or in cloud forest, July 3-18, 1941, Hoogstraal collector" and "Pedregal near Tancitaro, June 24 to July 2, elev. 6,000 ft. Hoogstraal collector." An additional male (which I leave without type designation, and collected from the last mentioned locality) is entirely rufotestaceous and differs also in the smaller and more densely punctate pygidium, which is also transversely impressed along the basal margin.

This interesting new species belongs in the difficult *aegrota* Bates group, but differs from that species in the slightly different genital characters and the much shorter antennal club, as well as the pilose pygidium. *P. tancitara* resembles *platti* Saylor in the form of the male genitalia but the thorax is less densely punctate, the disc is not pilose, and the clypeal form is different. The number of segments in the antenna varies from 8 to 9 (9-segmented antennae occurred in 4 males, and 8 in two males, and two individuals possessed 8-segmented antennae on one side and 9 on the other). All females have 9-segmented antennae.

***Phyllophaga (Listrochelus) cavatus michoacana*, new subspecies**

Male: Oblong-oval, strongly shining, color piceo-rugous, the head and legs more rufous, apparently glabrous above. Clypeus moderately long and reflexed, the apex subtruncate and the angles rounded; disc with fine, dense punctures over the entire surface. Front flat, the punctures small and variolate, dense and contiguous above and sparser near clypeal suture; vertex with a very obtuse, transverse elevation which is not at all carinate. Antenna rufotestaceous, 10-segmented; club pale and subequal to entire stem. Thorax with angles obtusely rounded, sides ciliate and subcrenate; disc with somewhat coarse, rather regularly-placed and dense punctures, each separated by once to twice their diameters. Elytron finely and very rugosely punctate, with very minute hairs, the striae obvious. Pygidium very convex, pruinose at base and polished apically; disc with fine and very sparse punctures; the narrowed apex subexplanate and subtruncate. Abdomen flattened, punctures very fine and moderately dense and with short recumbent pile; sides

pruinose; 5th segment flat and hardly punctate at base, transversely impressed apically and apical fourth with a distinct median longitudinal sulcus; 6th sternite very short, with a median longitudinal sulcus, the apical margin ciliate. All claws pectinate or subpectinate along a single margin, without intercalated large teeth. Genitalia symmetrical, in enface view the lateral lobes widely separated at apex, and the apex of each lobe broad though acute.

Female: Antennal club slightly shorter than funicle. Pygidium hardly convex, the base pruinose and the apex polished, with very sparse and fine punctures; apical margin explanate, faintly bidentate and with dense, short cilia. Abdomen polished at middle and very sparsely and finely punctate; 5th segment sparsely punctate at middle, pruinose at sides; 6th segment two-thirds the length of 5th, very coarsely and rugosely punctate, with a faint median longitudinal sulcus, and a moderate median emargination of the densely ciliate apex. Claws with a short median tooth, the surface basad of tooth crenulate. Otherwise as in the male. Length 13–15 mm. Width 7–8.5 mm.

The Holotype male and Allotype female, in the Saylor Collection, are from: "Cerro Tancitaro, Michoacan, Mexico, open pine forest at 10,500 feet elevation (female) and 11,500 feet (male), July 18, 1941, Hoogstraal collector." This subspecies differs from the typical form in the longer antennal club, slightly larger size, thoracic punctuation and male genital characters.

Phyllophaga (Phyllophaga) certanca, new species.

Male: Oblong oval, rufocastaneous and shining; hairy above, the elytra sparsely so. Clypeus moderately elongate, the apex subtruncate and faintly emarginate at middle, the angles very broadly rounded; disc evenly tumid (really convex) in basal part, the punctures coarse, very dense and contiguous, and with long erect hairs. Antenna 10-segmented, unicolorous rufous, the segments 3–5 small and globular, 6 and 7 slightly transverse, and the club small but nearly equal in length to the funicle. Thorax broad, the sides strongly and roundly dilated in front of the middle, the lateral margins ciliate, nearly straight, and at most minutely crenate; the fore and hind angles are very obtusely rounded; base not margined at middle; disc with coarse and moderately dense, rather regularly placed punctures, the latter separated by about once or twice their diameters and the entire disc with long and erect brownish pile; the discal punctures along the frontal margin are slightly smaller and a little denser. Scutellum smooth, with a few fine punctures at sides. Elytra finely, not densely, and somewhat rugosely punctured, the striae including the sutural obvious but not well developed; discal surface with sparse, short erect hairs. Pygidium moderately convex and highly polished; disc very finely and sparsely punctured, with short suberect apex ciliate and broadly rounded. Abdomen polished, flattened, finely and sparsely setigerously punctate, segments 2–4 very faintly and shallowly concave at middle; 5th gradually declivous in apical three-fourths, apical fourth widely and transversely impressed along the margin; the

center of the 5th with several small setigerous punctures and the sides of the segment with a moderately long transverse carina placed midway between the front and the hind margins of the sternite; 6th segment as long as the 5th, strongly flattened, the middle apex faintly and narrowly emarginate, and the basal margin somewhat carinate each side of the middle; disc of 6th with a few sparse tubercles and long erect hairs. First segment of hind tarsus slightly shorter than second; spurs free and graceful. Outer parts of the upper face of anterior tibia finely and densely punctate. Claws with a short submedian tooth strongly inclined basally and nearly touching the strong subquadrangular basal dilation. Hind femur with fine and dense suberect hair. Genitalia bilaterally symmetrical, with the ends of the lateral lobes free though touching; the genitalia are exactly the same shape as those of *plairi* Saylor except that in lateral view the lower half of the lateral lobe in *certainca* is less broadened. Length 13–15 mm. Width 7–8 mm.

Holotype male and 2 paratype males are from "Cerro Tancitaro, Michoacan, Mexico, 7,800 and 8,000 feet elevation, July 3–8, 1941, attracted to light, collected by Hoogstraal," and are in the Saylor Collection.

This species is nearest *plairi* Saylor but may be separated by the hairy thorax, sparsely punctate abdomen, basally-inclined median claw and the genital characters.

***Phyllophaga (Phyllophaga) haagi*, new species.**

Male: Small, oblong ovate and wider behind. Castaneous, somewhat shining and pilose above. Clypeus short and transverse, the subtruncate apex widely and moderately deeply emarginate, the margins faintly reflexed at middle and somewhat more obviously so at the narrowly rounded angles; disc coarsely, densely and setigiously punctate. Front flat, disc coarsely and densely punctured, the punctures shallow and each one rather evanescent posteriorly and bearing a moderately long and erect hair. Antenna nearly unicolorous castaneous, 10-segmented, the segments 3–6 of approximate size and rather short; club slightly darker and subequal to, or very faintly longer than, the entire stem. Thorax dilated at middle, the margins crenate and ciliate, the front angles nearly rectangular but not produced, and the hind angles sharp and rectangular; disc very densely and coarsely punctured, the umbilicate punctures nearly contiguous except on extreme sides and mid-center area of disc, and each puncture with a very long and erect brownish hair. Scutellum impunctate. Elytra extremely finely and very densely and rugosely punctate, the punctures hardly obvious due to the fine rugosity; disc densely covered with short subprocumbent hairs, and with some very long and erect hairs in basal scutellar regions; sutural costa entirely obsolete in apical fourth. Pygidium convex and polished, the subrounded apex slightly explanate and ciliate; disc with very fine and dense punctures separated by 2–3 times their diameter and with short suberect hairs, the discal area in apical fourth impunctate. Abdomen slightly flattened at middle and with very dense and quite fine punctures

and short, procumbent pile; 5th segment noticeably and transverse convex in apical half and the puncturation and pile same as on preceding sternites but slightly more dense; 6th sternite faintly longer than 5th, transversely flattened, the disc minutely and somewhat densely granulate, with sparse, short erect hairs, and a shallow median longitudinal sulcus. Hind spurs free and graceful; first two segments hind tarsus subequal in length. Claws dissimilar: those of fore and mid legs seemingly tridentate due to the long, acutely-dilated claw base, the middle claw slightly wider than, and as long as, the slender apical tooth; all three teeth are separated from each other by very narrow clefts; claws of hind legs cleft but apparently bidentate, since the base is very obtusely and roundly dilated and not extended to form a third tooth. Genitalia somewhat similar to those of *P. heteronycha* Bates but the lateral lobes are much thicker basally and in side view are abruptly reflexed towards their base, rather than evenly rounded. Length 12.-13. mm. Width 6-7 mm.

The Holotype male and paratype male in the Saylor collection are from: "Tancitaro, Michoacan, Mexico, altitude 6,000 feet, collected at light by R. Haag June 30, 1941, and by H. Hoogstraal July 16, 1941." This distinct species resembles *heteronycha* but the dorsal sculpturing and male genital characters will readily separate them.

Phyllophaga (Phyllophaga) tridilonycha, new species.

Male: Similar in all characters to *P. haagi* Saylor except as follows: Middle of clypeus very faintly emarginate and subtruncate. Antennal club barely equal to stem in length. Abdomen with slightly denser procumbent pile; 5th segment with a moderate convexity starting at each side of middle base and running very obliquely apically, the disc with fine, dense, and transverse granules; 6th sternite as long as 5th and with a very distinct median longitudinal sulcus, the entire disc with dense, fine granules and very short erect hairs. All claws seemingly tridentate due to the long tooth-like basal dilation and the claws on all the legs similar in shape. Genitalia slender as in *heteronycha* Bates but the lateral lobes when viewed laterally slightly wider basally.

Female: Similar to male except: Clypeus shorter and angles more broadly rounded. Thorax more sparsely punctured. Elytral hairs longer. Antennal club subequal to segments 3 to 7 in length. Pygidium small, the apex much narrowed, and the disc tumid just before the apex. Abdomen with 5th abdominal plane; 6th slightly shorter than 5th much narrowed and quite rounded apically, and very sparsely punctate. Fore and middle claws as in male, the hind claws however bidentate (i. e. narrowly cleft) due to the small, obtuse and not-prolonged claw base. Length 12.-13 mm. Width 6.5 mm.-7 mm.

The Holotype male and Allotype female in the Saylor Collection are from "Real de Arriba, near Temascaltepec, Mexico, collected by Howard E. Hinton." This species, which belongs in the *P. heteronycha* Bates group (which among other things possesses dissimilar male claws) was compared with the type of *baroni* Bates in the British Museum through

the kindness of Mr. G. Arrow. *P. tridilonycha* is closest to *tridens* Bates (known only from the female) from Oaxaca, but differs as follows: claws of fore and hind feet are dissimilar; the female clypeal apex is less reflexed and only feebly sinuate if at all, and the thoracic angles are distinctly rectangular. While not collected by the Hoogstraal expedition, the present species is so closely allied to *haagi* that it is best included here.

***Onthophagus hoogstraali*, new species.**

Male: Color testaceo-rufous above, slightly shining, the head and prothoracic foveation black; legs rufous, underside of body piceous. Head nearly flat, polished, sparsely and very minutely punctate, the vertex with a sharp, moderately-long, perpendicular tooth midway between the small eyes. Clypeus with apex truncate and the margin reflexed backwards into a very large T-shaped lobe which is truncate apically and nearly twice as broad at apex as at base, and which reaches backwards nearly to the front margin of the eyes; the front or upper surface of the lobe is very finely but obviously punctate. The genae are acute and explanately produced laterally and in front of the eyes, and are but slightly reflexed upwardly. Thorax moderately rounded at sides, the front angles blunt but subrectangular, the hind angles broadly rounded and hardly obvious; the disc slightly in front of the middle is declivous apically and at each side of the middle very strongly raised into an obtuse lobe, the U-shaped declivity between these lobes polished, smooth and minutely punctate; the remainder of the thoracic disc is variolately punctured and with short erect setae, the punctures being coarse but sparsely placed on the disc, and base, but becoming noticeably smaller at the extreme sides and near the front angles. Elytra minutely reticulate and the striae strong, and coarsely punctured; intervals flat, with two irregular rows of punctures each bearing a short blunt seta; each elytron has 6 complete striae (including the sutural) between the suture and the humeral angle, and a seventh incomplete stria which attains the humeral angle. Pygidium minutely reticulate and not obviously punctured, and with sparse, short erect setae. Metasternum finely and sparsely punctate, with short hair. Front tibia 4-dentate, the spur strong and slightly curved. First segment hind tarsus very nearly equal in length to the following 4 combined, the spur subequal in length to the first tarsal segment. Length 10.5 mm. Width 6 mm.

The unique male Holotype in the Saylor Collection is from "Pedregal near Tancitaro, Michoacan, Mexico, 6,000 feet, June 23, 1941, collected by H. Hoogstraal, under moss at the base of an oak tree." From the habitat it may be that this is one of the fungus-feeding group. This beautiful species runs to *O. dicranus* Bates (from Panama) in Boucomont's "Group 3," but the clypeal horn is much wider and is not bifurcate, and the thorax has a deep depression at the middle rather than two subdentate tubercles, and also the size is nearly 5 mm. larger in *hoogstraali*.

PROCEEDINGS
OF THE
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NEW FORMS OF *ANTHREPTES* AND *SEICERCUS*
(AVES) FROM THE INDO-CHINESE
SUB-REGION.

H. G. DEIGNAN.¹

The unique specimen of *Seicercus castaniceps* from the mountains of northwestern Thailand cannot be placed with *castaniceps* (Nepal), *butleri* (Malay States), *stresemanni* (Bass Laos), *annamensis* (South Annam), nor *sinensis* (Fokkien). It may constitute the type of a new subspecies, which I propose to call

Seicercus castaniceps collinsi, subsp. nov.

Type.—Adult male, U. S. National Museum no. 330867, collected on Doi Langka (Khun Tan range), northwestern Thailand, April 22, 1931, by H. M. Smith.

The new race belongs to that section of the species in which the yellow of the underparts is restricted to the flanks, while the centre of the abdomen is white; by this character it may at once be separated from the yellow-bellied forms, *sinensis* and *annamensis*. From *butleri* it is immediately recognizable by having the two outermost pairs of rectrices wholly white on the inner webs, instead of merely narrowly tipped and edged with whitish. From *castaniceps* it differs in having the whole dorsum gray (only next to the yellow rump having a faint suffusion of olive-green) and in having the rump and flanks of a more greenish yellow. From *stresemanni* it is separable by having the gray on the dorsum of greater extent and by having the crown a much paler chestnut-rufous (exactly matching the color of this part in *sinensis* and *castaniceps*).

In short, as might be expected from its intermediate geographical position, *collinsi* combines into a new pattern characters found in *butleri*, *stresemanni*, and *castaniceps*.

Seicercus "castaniceps" youngi, known only from two high peaks in

¹ Published with permission of the Secretary of the Smithsonian Institution.

Peninsular Thailand, is so distinct that I hesitate to consider it conspecific with the birds discussed above.

The new form is named in honor of my friend Henry B. Collins, jr., Bureau of American Ethnology, in recognition of his interest and studies in the fields of Indo-Chinese ethnology and anthropology.

II.

A specimen of the purple-naped sunbird (*Anthreptes hypogrammica*) from Cochin-China (one of two yet known from that colony), just ending the post-nuptial moult and accordingly in fine fresh plumage, is so distinct from the four recognized races of the species (although in no extraordinary fashion) that I do not hesitate to establish the new form

Anthreptes hypogrammica mariae, subsp. nov.

Type.—Adult male, U. S. National Museum no. 332545 (orig. no. 52), collected at the Arboretum of Trang Bom, province of Bienhoa, Cochin-China, August 14, 1932, by A. Poilane.

Mariae shows the following characters:

Bill equal in length to that of *lisettae* (Annam) and probably that of *natunensis* (North Natuna Islands), longer than those of *hypogrammica* (Sumatra) and *nuchalis* (Singapore).

Nuchal collar, rump, and upper tail-coverts metallic purple as in *lisettae*, not steel-blue as in the other races.

Front and crown greyish olive-green as in *lisettae*, the remaining upper-parts (including the exposed portions of the wings but not the tail) olive-green, with less golden suffusion than in any other form.

The upper surface of the central pair of rectrices not uniform black as in the three Malaysian races, nor olive-green as in *lisettae*, but black, narrowly edged with olive-green and elsewhere faintly washed with that color.

All but the central pair of rectrices broadly tipped beneath with white, as in *nuchalis* and *natunensis*, not narrowly with white as in *hypogrammica* nor broadly with yellowish-white as in *lisettae*.

The underparts with less yellow than any other form: the ground color of chin, throat, and upper breast white, of lower breast and upper abdomen creamy, of the lower abdomen and the flanks yellowish olive-green, of the under tail-coverts olivaceous-yellow as in *nuchalis*, not bright deep yellow as in *lisettae*; the broad central streaks of the feathers olivaceous-slate (those of the chin, throat, and upper breast almost wholly free of olive tinge), the under wing-coverts and axillaries almost pure white.

The collector has noted on his label: "Petit oiseau qui visite les fleurs de bananiers. Rare."

Anthreptes h. mariae is named in honor of my wife.

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A NEW GENUS OF CUBAN UROCOPTID MOLLUSKS.

BY PAUL BARTSCH.

In the preparation of a monograph on the Cuban members of the family Urocoptidae, Dr. Carlos de la Torre and I found that it was necessary to recognize a new subfamily, Tetrentodoninae, based on the structure of the radula typified by the genus *Tetrentodon*. This subfamily embraces about one-half of the Cuban fauna. The largest genus in this subfamily, here defined, proves to be without a name and I feel that it is only a just tribute to Don Carlos, who has done more than all the other Malacologists to make Cuba's fauna known to science, to connect his name with this new group. Since Don Carlos' modesty would preclude this being done in our joint monograph, I take this opportunity to so do here.

TORRECOPTIS, new genus.

Small urocoptid mollusks having a tetrentodonic radula and a columella provided with a single serrate lamella.

Type.—*Torrecoptis bacillaris* [Torre]—*Urocoptis* (*Gongylostoma*) *bacillaris* Torre.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF FINCH FROM ECUADOR.

BY JOHN T. ZIMMER.

Among a number of birds received from eastern Ecuador is a specimen of a finch closely allied to the genus *Saltator*. It may be known as follows.

Saltator cinctus, new species.

Type from Cutucú [near Macas], eastern Ecuador; altitude 2,000 meters. No. 748,391 American Museum of Natural History. Adult female collected December 28, 1940, by Leopoldo Gomez.

Diagnosis.—Somewhat resembles males of *Pitylys grossus grossus* of Amazonia in color of upper parts but very different below. Throat broadly black instead of white; black pectoral band narrower; white chest patch broader and more posterior in position; belly and under tail-coverts white instead of gray; tail much more strongly graduated and broadly tipped with white; bill a little smaller, black instead of reddish, and without a tooth on the middle of the maxillary tomium.

Compared with *Saltator aurantirostris albociliaris* of eastern Perú, the coloration is quite different. Upper parts darker and more bluish slate; forehead not broadly black; no white stripe above auriculars; throat broadly black instead of white; pectoral bar narrower and straighter, less arcuate; belly and under tail-coverts white instead of ochraceous; flanks gray instead of brownish; under wing-coverts gray instead of whitish; three outer rectrices with broad tips of nearly equal extent and tail much more graduated; bill blackish.

Range.—Known only from Cutucú, Ecuador.

Description of type.—Upper parts Dark Plumbeous (Ridgway) the subterminal parts of the feathers more dusky; nostril feathering, lores, a very narrow line above eye, the malar region, auriculars, chin, and upper throat black, forming a broad mask; this is continued posteriorly in a broad stripe that crosses the breast, leaving a broad, triangular patch of white on the chest; extreme sides of breast, sides of neck, broad flanks, and thighs Deep Neutral Gray (Ridgway); belly broadly white; under tail-coverts white with mostly concealed gray subterminal areas. Remiges blackish with gray outer margins, paler on the primaries; upper wing-

coverts similar; under wing-coverts gray with a few whitish tips; bend of wing inconspicuously whitish; inner margins of remiges tinged with drab. Tail black, strongly graduated, the feathers somewhat broadly pointed, with outer feathers 33 mm. shorter than the middle ones; outer three pairs with broad white tips (20 mm. in length on outermost pair); next two pairs with tips noticeably shorter; median pair with only inconspicuous white points at the tip. Bill (in dried skin) black, with a touch of dull red toward the tip of each side of the maxilla and a larger and paler area near the tip of the mandible; gonys with a fine ridge; feet black. Wing, 98 mm.; tail, 108; exposed culmen, 18; culmen from base, 21; tarsus, 26.25.

In spite of the close resemblance to *Pitylus grossus* in dorsal coloration, the affinities of the present species appear to be with *Saltator* rather than with *Pitylus* as that genus is currently distinguished. The tarsus is longer than the culmen from base and the median portion of the maxillary tomium is without a prominent tooth. In the shape of the bill, as well as in the white-tipped rectrices, there is a certain similarity to members of the *Saltator aurantiirostris* group, but the coloration is divergent and the strong graduation of the tail reaches an extreme not found in the other members of the genus *Saltator* nor in *Pitylus*.

There is some possibility that the specimen is wrongly sexed since the pattern is quite sharp and clear, whereas in the females of these birds the colors are inclined to be a little duller, especially in *Pitylus*. In any case, the discovery of the other sex, whichever it may prove to be, will be awaited with much interest.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

ON NINE NORTH AMERICAN POLYDESMOID
MILLIPEDS.

BY RALPH V. CHAMBERLIN.

The types of all but one of the nine species here described are in the Field Museum of Natural History to the officers of which I am indebted for the privilege of studying the milliped collection of that institution. The ninth species, *Tidesmus hubbsi*, is a cave-dwelling form represented by specimens recently taken by Dr. Carl L. and Earl L. Hubbs. These specimens, for which I thank Dr. Hubbs, are at present in the author's collection.

Genus **TIDESMUS**, new.

Composed of head and twenty segments. Like *Polydesmus* in having on each ordinary tergite three transverse rows of well-defined elevated areas or tubercles. Differing from *Polydesmus* in narrower keels and in having these much shorter, mostly shorter than or equal to the middle part of metazonite, longer only in posterior region. Prozonites well exposed, giving body a submoniliform appearance.

Gonopods of male with coxal division large, with hook ending in cavity in basal part of distal division; distal division with axis oblique to that of coxa, with a long, slender accessory process from base typically expanded at tip. (See further figures of genotype).

Genotype.—*Tidesmus episcopus*, new species.

The name of this genus is derived from the Gosiute Indian *tida*, meaning small ÷ *desmus*. *Microdesmus* was first considered but could not be used as it was previously employed in the Diplopods by Verhoeff (1901), and still earlier (1864) in fishes by Guenther. A new name must be given for Verhoeff's genus and, accordingly, *Nannodesmus* nom. nov., is here proposed.

Tidesmus episcopus, new species.

A small form of the usual brown color in which the keels, at least in the Preserved types, do not appear especially lighter than the mid-dorsum. Legs lighter brown or yellowish.

Keels short, with posterior corners rounded or at most subrectangular on segments in front of 15th; posterior corners of 15th and following keels moderately produced caudad; no tooth on anterolateral corner, the lateral serrations behind these small but distinct and of usual number. (See fig. 1). Dorsal tubercles and setae normal.

Gonopods of the male as represented in figs. 2 and 3.

Length, about 9–9.5 mm.; maximum width, .85 mm.

Locality.—California: Los Angeles, Bishop's Road, Reservoir Hill. January 2, 1939. Four specimens taken by Gordon Grant.

Tidesmus hubbsi, new species.

White in color throughout. Head clothed with short, straight, apically pointed setae, which are most numerous above and down front. Antennae clavate.

Collum with anterior margins strongly convex, the posterior less convex the two margins meeting at each end in an angle; three transverse series of tubercles, each of which bears a short clavate seta.

Metatergites of anterior and middle region of body without obvious transverse sulcus, having three transverse series of well-developed tubercles, each having at its caudal elevated apex a short clavate seta. Keels somewhat shorter than the middle part of metatergite, those of posterior region longer; posterior corners not produced, rectangular; lateral margin with three small setiferous teeth. In posterior keels the corners moderately produced caudad, the lateral teeth slight. (See fig. 4). Last tergite triangular, decurved, bearing longer acuminate setae.

Length, 5 mm.; width, .43 mm.

Locality.—Nevada: Northern Lincoln Co., deep in cave of Cave Valley. Several females taken June 25, 1942, by Carl L. and Earl L. Hubbs.

Polydesmus conlatus, new species.

Dorsum dark brown with the keels abruptly lighter, yellowish, sometimes of a brick-red cast. Antennae dark brown to blackish, legs light brown.

Keels with lateral serrations minute, in part almost obliterated with margins there nearly smooth.

The male gonopods are distinctive. (See fig. 5.)

Length of male holotype, about 20 mm.; width, 3.8 mm.

Localities.—Tennessee: Great Smoky Mts. National Park, Gatlinburg. June 13–19, 1942. Several males and females taken by H. Dybas.

Georgia: Thomasville, Chakri. April 2, 1940. A male and female taken by Dr. F. Field.

Polydesmus modocus, new species.

Dorsum brown, with the keels not definitely paler.

Collum with a small lateral serrature.

Keels broad, with serrations well developed. Dorsal surface of metazonites with the usual elevated areas, these low, rounded and shining.

Best differentiated by the gonopods of the male, the principal features of which are shown in fig. 6.

Length of male holotype, 18 mm.

Locality.—Illinois: Randolph Co., between Modoc and Roots, April 14, 1936. One male. K. P. Schmidt.

A species close to *P. hubrichti*, occurring in Missouri and Arkansas. The gonopods of male are very similar to those of that species but seem to differ in having a pencil of setae proximad of the second tooth from tip in place of a single spine.

***Aporiaria fumans*, new species.**

Dorsum typically solid black, with posteriolateral portion of keels yellow. Legs yellow to yellowish brown. Antennae with articles blackish distally, brown proximally.

Sternites and coxae excepting those of the second legs, without processes. Processes of second coxae short and rounded. Distal spines of second joint of legs in anterior pairs short and obtuse, but normally prolonged and acute on posterior pairs.

Distinguished especially by the details of the gonopods, the two-pointed apex of telopodite being especially characteristic (See fig. 9.).

Length of male holotype, 26 mm.; width, 5 mm.

Locality.—Tennessee: Great Smoky Mts. National Park, Greenbriar Cove, June 13-19, 1942. One male and one female collected by H. Dybas.

***Aporiaria brunrior*, new species.**

This, the smallest of the known species of the genus, has the dorsum brown with keels and a transverse band over caudal border of metazonites yellow, thus contrasting with the other known species in which the dorsum is black. Antennae and legs light.

Keels without anterolateral denticle, the margin being smooth throughout; posterior corners produced beginning with the 5th or 6th, the production becoming more pronounced in posterior segments as usual.

All coxae without spines.

Gonopods of male as shown in fig. 10.

Length of male holotype, about 20 mm.; width, 4 mm.

Locality.—Tennessee: Gt. Smoky Mts. Nat. Park. June 5, 1941. One male taken by J. Miller.

***Epeloria fictus*, new species.**

The colors are faded in the poorly preserved holotype, but the dorsum appears to have been light brown, with the keels yellow.

A smaller form than *E. talapoosa*, the genotype, from which the differences in the gonopods of the male are conspicuous, especially noticeable being the divergence of the two terminal branches of the telopodite. See fig. 11.

Coxae of legs not spined as in *bifidus*.

Width, 6.5 mm.

Locality.—Georgia: Thomasville, Chakri. April 5–10, 1940. A male and female taken by Dr. H. Field.

***Eurymerodesmus schmidtii*, new species.**

A relatively large form in which the metatergites are brown with keels and a transverse caudal band, conspicuously widening from ends to middle are lighter.

Prozonites paler above, darker at sides. Legs brownish yellow, the antennae brown.

Nineteenth keels with processes distally rounded, the 18th and preceding ones nearly acute.

Distinguished primarily by differences in form of telopodite of male gonopods and the number and grouping of setae on the same. See fig. 7.

Width, 5.8 mm.

Locality.—Arkansas: Polk Co., Rich Mts., El. 2,400 feet., March 22, 1938. Ten specimens, in part immature; also 4 specimens 4 mi. east of Hotel site on Rich Mt., El. 2,800 feet, March 21, 1938. All specimens collected by K. P. Schmidt.

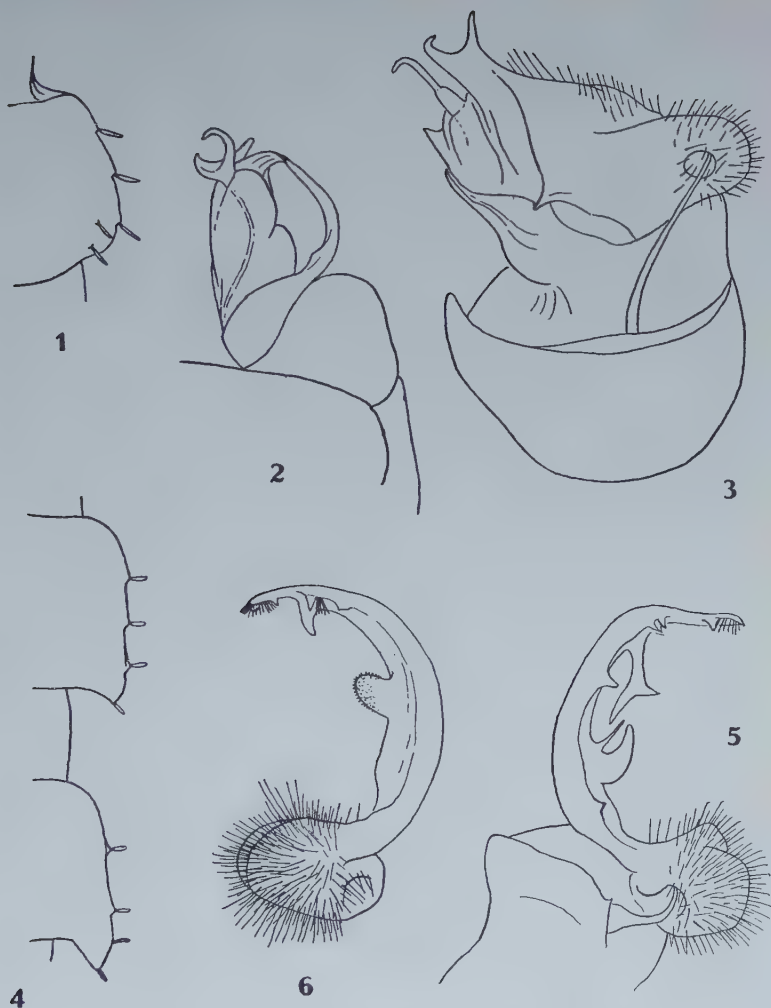
***Eurymerodesmus dubius*, new species.**

Metazonites somewhat chocolate colored, with keels and a narrow stripe across posterior border lighter. Yellow in preserved specimens. Prozonites lighter in a geminate median area, darker at sides. Legs yellow proximally, darker distally. Keels with anterolateral tooth absent, as usual, the margin wholly smooth. Processes of posterior keels well developed, distally rounded.

Distinguished especially by the gonopods of male which are short, with distal blade small and erect as shown in fig. 8.

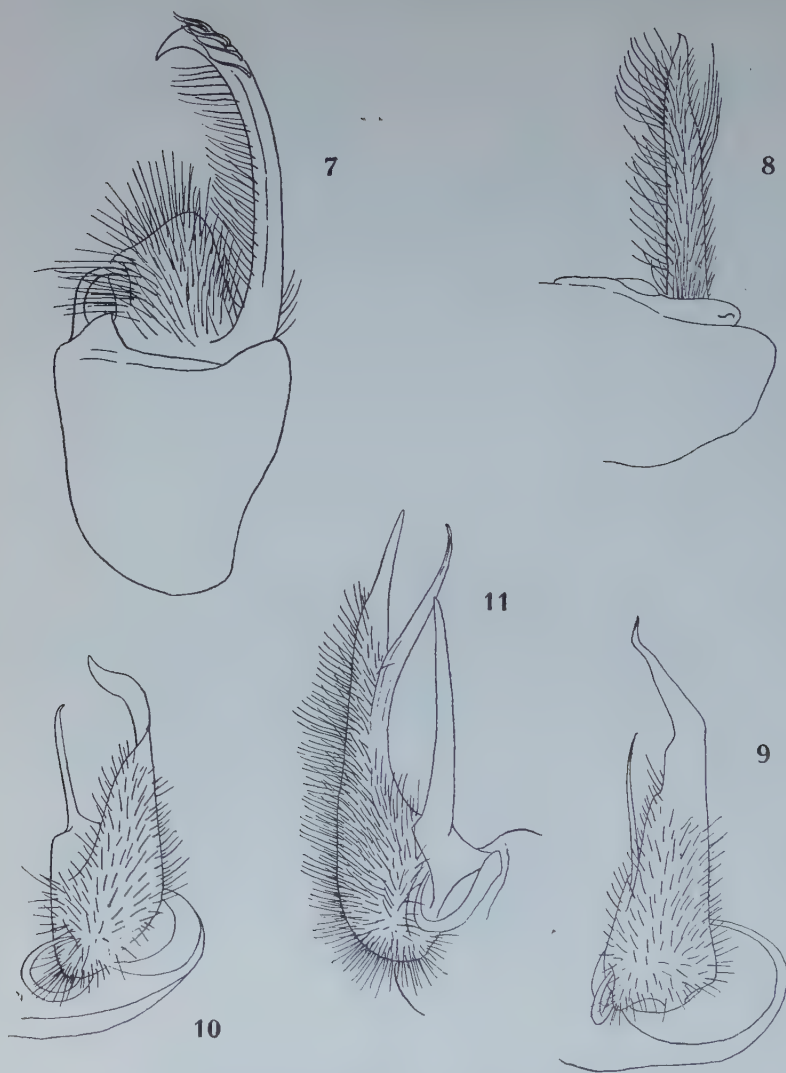
Width, 5.6 mm.

Locality.—Arkansas: Pike Co., Delight. April 16, 1941. One adult male and an immature specimen taken by K. P. Schmidt.



I.

- Fig. 1. *Tidesmus episcopus*, sp. n. Right keel of 6th segment.
 Fig. 2. The same. Right gonopod of male in situ, anterior view.
 Fig. 3. The same. Left gonopod of male, mesal view.
 Fig. 4. *Tidesmus hubbsi*, sp. n. Right keels of 18th and 19th segments.
 Fig. 5. *Polydesmus conlatus*, sp. n. Left gonopod of male, mesal view.
 Fig. 6. *Polydesmus medicus*, sp. n. Right gonopod of male, coxal division omitted, mesal view.



II.

Fig. 7. *Eurymerodesmus schmidtii*, sp. n. Gonopod of male, subanterior view.

Fig. 8. *Eurymerodesmus dubius*, sp. n. Gonopod of male.

Fig. 9. *Aporiaria fumans*, sp. n. Left gonopod of male, ventral view.

Fig. 10. *Aporiaria brunnior*, sp. n. Left gonopod of male, view a little mesal of ventral.

Fig. 11. *Epeloria ficta*, sp. n. Right gonopod of male, mesal aspect.

PROCEEDINGS
OF THE
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THE MOLLUSCAN GENUS *TROCHITA* SCHUMACHER WITH A NOTE ON *BICATILLUS* SWAINSON.¹

BY HARALD A. REHDER,

Associate Curator, Division of Mollusks, United States National Museum.

The genus *Trochita* was instituted by Schumacher in 1817 (Essai Nouv. Syst. Habit. Vers Test., pp. 57, 184), and consisted of two sections, one typified by *Patella chinesis* Linne and the other by *Trochita spiralis* Schumacher, which he based on plate 4, figure A2 of the Favannes' La Conchyliologie, 1780. The earliest type designation of this genus that I have found is that of Gray (Proc. Zool. Soc. London, pt. 15, 1847, p. 158), who cites *Patella trochoides* as type. This designation is strictly speaking not valid, as the species *trochoides* appears nowhere in Schumacher's diagnosis. *Patella trochoides* Dillwyn 1817, is, however, synonymous with Schumacher's *Trochita spiralis*. Dall's designations of *Trochus radians* Lamarck as type (U. S. Geol. Survey Prof. Paper 59, 1909, p. 81) is similarly not valid in the strict sense, as *radians* is not mentioned by Schumacher, although it too is the same shell as *spiralis*. To put the genus on a firm basis, I am here designating as type of *Trochita* Schumacher 1817 the species *Trochita spiralis* Schumacher 1817 (= *radians* Lamarck 1816).

Trochita Schumacher 1817.

1817. *Trochita* Schumacher, Essai Nouv. Syst. Habit. Test., pp. 57, 184. Type (here designated): *Trochita spiralis* Schumacher (= *T. radians* Lamarck).
 1830. *Trochatella* Lesson, Voyage Coquille, Zoologie, vol. 2, pt. 1, p. 396. Type (by monotypy): *Calyptraea araucana* Lesson (= *T. radians* Lamarck).
 1840. *Trochilla* Swainson, Treatise on Malacology, p. 355. Type (here designated): *Infundibulum pileus* Sowerby, 1839, not Lamarck, 1822 (= *Trochita radians* Lamarck).
 1867. *Clypeola* Gray, Proc. Zool. Soc. London, 1867, p. 735. Type (by tautonymy): *Trochita clypeolum* Reeve (= *T. decipiens* Philippi).

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Trochita is one of four rather closely related genera of the subfamily Calyptraeinae. One of these is *Calyptraea* Lamarck 1799, which inhabits in general the rather homogeneous zoogeographical area that I am calling the NEOTETHYAN AREA, which includes the tropical and subtropical east and west Atlantic regions, and the east Pacific region from Lower California to Ecuador. (I have chosen this name as the faunal similarity of this area is traceable to the post-Oligocene stage of Suess' Tethys Sea, when the Indo-Malaysian portion of that body of water became differentiated from the Atlantic-Mediterranean portion). The presence of a species of this genus (*C. capensis* Tomlin) in South Africa is worth noting. Two other genera are *Sigapatella* Lesson 1830 and *Zegalerus* Finlay 1926, which inhabit the Neozelanic and South Australian regions. *Trochita* itself is found in the Peruvian, Magellanic and South African provinces and is thus zoogeographically close to the Neozelanic groups; this distribution is interesting in that it points to the faunal kinship of these notal regions. There is also a species apparently inhabiting the West African region; this form is discussed more fully below.

The radula (figures 1, 2) differs from that of *Sigapatella* (Peile, Proc. Malac. Soc. London, vol. 16, pt. 1, 1924, p. 22, figs. 1, 2) in that the lateral teeth have a comparatively smaller cutting portion, the inner margin of which is without denticles, and the marginals are shorter, broader, more hook-like.

The male genitalia are strikingly like that of *Littorina irrorata* Say (see figure 3).² A detailed anatomical study of *Trochita radians* is given by Kleinstüber in Fauna Chilensis, vol. 4 (Zool. Jahrb., Suppl. 13), 1913, pp. 385-476.

Trochita radians Lamarck.

- 1742. ——— d'Argenville, Hist. Nat. Lith. et Conch., p. 240, pl. 6, fig. L.
- 1768. ——— Knorr, Delic. Yeux et Esprit, pt. 3, p. 53, pl. 29, figs. 1, 2.
- 1769. *Lepas intus concamerata*, ———, Martini, Conch. Cabinet, vol. 1, p. 162, pl. 13, fig. 135.
- 1780. Le Bouton de Chapeau, Favanne, La Conchyliologie, vol. 1, p. 552, pl. 4, fig. A2.
- 1791. *Patella trochiformis* var. Gmelin, Systema Naturae, ed. 13, vol. 1, pt. 6, p. 3694.
- 1816. *Trochus radians* Lamarck, Encycl. Meth. (Vers) pl. 445, figs. 3a, 3b; Liste des objets, p. 10.
- 1817. *Patella trochoides* Dillwyn, Descr. Cat. Recent Shells, vol. 2, p. 1018.
- 1817. *Trochita spiralis* Schumacher, Essai Nouv. Syst. Habit. Test., p. 184.
- 1822. *Trochus radians* Lamarck, Hist. Nat. An. s. Vert., vol. 7, p. 11.
- 1829. *Trochus radians* Schubert & Wagner, Syst. Conch. Cab., vol. 12, p. 131, pl. 229, fig. 4063a, b.
- 1830. *Calyptraea peruviana* Deshayes, Encycl. Meth., vol. 2, pt. 1, p. 170.
- 1830. *Calyptraea (Trochatella) araucana* Lesson, Voyage Coquille, Zool., vol. 2, pt. 1, p. 396.
- 1836. *Calyptraea radians* Deshayes, Hist. Nat. An. s. Vert., ed. 2, vol. 7, p. 626.
- 1839. *Infundibulum pileus* Sowerby, Conch. Manual, p. 123, figs. 237-238; not of Lamarck.
- 1841. *Calyptraea (Trochatella) trochiformis*, d'Orbigny, Voyage Amer. Merid., vol. 5, pt. 3, p. 461, pl. 59, fig. 3; not of Gmelin 1791.
- 1846. *Infundibulum radians*, d'Orbigny, op. cit., p. 701.
- 1852. *Trochita spirata* Forbes, Proc. Zool. Soc. London, pt. 18, 1850, p. 271.
- 1854. *Trochita radians*, H. & A. Adams, Genera Moll., vol. 1, p. 366, pl. 40, fig. 5a.

² The radulae have been prepared by Dr. J. P. E. Morrison, who has also made the drawings used in this paper.

- ?1857. *Trochita ventricosa* Carpenter, Cat. Reigen Coll. Mazatlan Moll., pp. 264–265 (erroneous locality?)
 1891. *Trochatella radians*, Stearns, Proc. U. S. Nat. Mus., vol. 14, p. 328.
 1907. *Trochita trochiformis* Dall. Proc. U. S. Nat. Mus. (no. 1704), vol. 37, pp. 175, 233; not of Gmelin 1791.

Several species listed by Tryon (Manual of Conchology, vol. 8, 1886, pp. 121–122) as belonging to this species are not *Trochitas*, but probably *Crucibulum*. These are: *Calyptraea sordida* Broderip 1834, and *intermedia* d'Orbigny 1841.

I am not here considering the Tertiary forms as they will need careful study. Forms such as *Trochita costellata* Conrad (not Philippi 1845), *Calyptraea diabloensis* Clark, and *C. martini* Clark may be close to *Trochita radians* Lamarck, but for the present they had best be kept distinct.

This is the species which has been called *Trochita trochiformis* Gmelin (Dall l. c. and later authors), an error resulting at least in part from Tryon's lumping of the Magellanic and Peruvian forms.

Gmelin had quite correctly separated the Peruvian species as variety β of his *trochiformis*, but his typical form still contained a mixture which apparently no one has resolved. The confusion dates from Chemnitz, who in 1788 (Conchylien-Cabinet, vol. 10, p. 335, pl. 168, figs. 1626–1627) described and figured a species as *Patella trochiformis* from Tranquebar. As synonym he cited the quite different Falkland Island species described by the Favannes (see under *Trochita pileus* Lamarck below). Gmelin followed him (Syst. Nat., ed. 13, vol. 1, pt. 6, p. 3693), basing his description on Chemnitz, and adding four bibliographic references, which refer to *Trochita*. Later authors either synonymized Gmelin's name under *Trochita radians* Lamarck, or considered it the earliest name for this Peruvian form, regarding the Chemnitzian figure as bad, and the locality erroneous. A glance at Chemnitz's description and figure, however, shows that we are dealing with a species of *Bicatillus* (subgenus *Desmaulus* Rehder; see below). His phrase (literally translated) "Internally a thin lamella which is hollow inside arises from the center and sidewall," can only refer to a species of this group, and the locality is undoubtedly correct, as there are similar ribbed species from Ceylon and the west coast of India in the collection of the U. S. National Museum. Lack of sufficient material from southern India prevents fixing the exact relationship of *Bicatillus* (*Desmaulus*) *trochiformis* Gmelin. *Crucibulum verrucosum* Reeve 1859 and *Crucibulum violascens* Carpenter 1856 from Ceylon, are related species belonging to the subgenus *Desmaulus*.

Of the later authors Strebel (Zool. Jahrbüchern, Abt. Syst., Geogr., Biol. Tiere, vol. 24, pt. 2, 1906, pp. 159–162) has noted the difference between the Peruvian and Magellanic species.

According to specimens in the U. S. National Museum, *Trochita radians* ranges from Manta, Ecuador, to Valparaiso, Chile.

The radula of a specimen from Pisco, Peru, collected by R. E. Coker (U. S. N. M. No. 207730) is shown in figure 1.

Trochita pileus Lamarck.

1780. *Le Lepas volute*, Favanne, *La Conchyliologie*, vol. 1, p. 551, pl. 4, fig. A1.
 1817. *Patella trochiformis* Dillwyn, *Descr.-Cat. Recent Shells*, vol. 2, p. 1018 (in part).
 1822. *Trpchus pileus* Lamarck, *Hist. Nat. An. s. Vert.*, vol. 7, p. 11.
 1841. *Trochus pileus* Delessert, *Receuil Coquilles Lamarck*, pl. 34, figs. 5a, b.
 1845. *Calyptraea costellata* Philippi, *Archiv f. Naturgeschichte*, vol. 12, pt. 1, p. 62.
 1859. *Trochita corrugata* Reeve, *Conch. Iconica*, vol. 11, *Trochita*, pl. 2, sp. 9.
 1867. *Clypeola corrugata* Gray, *Proc. Zool. Soc. London*, 1867, p. 735.
 1898. *Calyptraea (Trochita) radians* Melvill and Standen, *Journ. of Conch.*, vol. 9, p. 101; not Lamarck 1816.

This species is found on the mainland from the region of Tierra del Fuego and the Straits of Magellan north to Cabo San Antonio, northern Argentina (Strebel, *Wiss. Ergebn. Schwed. Südpolar-Exped. 1901-03*, vol. 6, pt. 1, *Die Gastropoden*, p. 59). It also inhabits the Falkland Islands.

I have shown above that the name *trochiformis* Gmelin cannot be used for this species as Dillwyn and later authors have done. The next available name is that of Lamarck.

Trochita decipiens Philippi.

1845. *Calyptraea decipiens* Philippi, *Archiv f. Naturgeschichte*, vol. 12, pt. 1, pp. 61-62.
 1859. *Trochita clypeolum* Reeve, *Conch. Icon.*, vol. 11, *Trochita*, pl. 3, sp. 14.
 1867. *Clypeola magellanica* Gray, *Proc. Zool. Soc. London*, 1867, p. 735.
 1867. *Clypeola corrugata* var. *laevis* Gray, *l. c.*, p. 735.

The validity of this form, which inhabits the same region as the foregoing species, is doubtful as it may be only a smooth variant of it—Strebel so considers it.

The radula of this form is shown in figure 2, taken from a specimen collected in the Magellan Straits by the U. S. Bureau of Fisheries in 20 fathoms (Sta. 2777). It differs from that of *Trochita radians* in lacking denticles on the edges of the marginals; otherwise, they are very similar.

Trochita helicoidea Sowerby.

1883. *Trochita helicoidea* Sowerby, *Thesaurus*, vol. 5, pp. 64-65, pl. 449, figs. 53-54.
 1892. *Trochita helicoidea*, Sowerby, *Marine Shells of South Africa*, p. 39.
 1915. *Trochita helicoidea*, Bartsch, *U. S. Nat. Mus. Bull.* 91, p. 136.
 1932. *Trochita helicoidea*, Turton, *The Marine Shells of Port Alfred, S. Africa*, p. 154.

This species resembles the Magellanic form in being umbilicated, but has noticeably convex whorls.

This name, originally based on a specimen from an unknown habitat, was assigned by Sowerby himself only nine years after the original description, to this South African form. Hence this identification is here accepted, as has generally been done, although the original figure shows a shell differing from the normal ones in having an involute columellar margin as is found in certain *Crepidulas*.

Specimens in our collection come from Jeffreys Bay on the Humansdorp coast, west of Port Elizabeth, and from Port Alfred.

Trochita species.

1853. *Calyptraea radians* Dunker, *Index Moll. ad Guineam Inf. coll. Tams*, p. 36.
 1893. *Trochatella radians*, Stearns, *Proc. U. S. Nat. Mus.*, vol. 16 (no. 940), p. 335.

1898. *Calyptraea radians*, Locard, Exped. Sci. Travailleur et Talisman. Moll. Test., vol. 2, p. 62.
 1909. *Calyptraea radians*, Nobre, Bull. Soc. Portugaise Sci. Nat., vol. 3, suppl. 2, p. 3.
 1911. *Calyptra (Trochita) radians*, Dautzenberg, Ann. Inst. Oceanogr. Monaco, vol. 5, fasc. 3, p. 50.

This species has been found at Benguela and Mossamedes Bay (subfossil as well as living at the latter locality) in Angola, and in the Cape Verde Islands, with no record from the intervening area. There has been no description or figure published of this form, which has been said to be inseparable from the Peruvian-Chilean species. The only specimen I have seen is that mentioned by R. E. C. Stearns from Porto Grande, Cape Verde Islands, a broken, wave-worn shell, which, if there were no further records of this species from these islands I would have unquestionably called a ballast shell, as in that condition it is hardly distinguishable from *Trochita radians*. Under these circumstances I deem it unwise to name this form until better specimens come to hand. For the same reasons an extended discussion of the presence of this southern group in such northerly waters would be meaningless.

Trochita phlyctiphera Rochebrune, 1883, from Senegambia, is not a true *Trochita*, judging from the brief description.

The name *Bicatillus* Swainson 1840 (Treatise Malac., p. 5) has usually been bestowed on the recent species grouped around *extinctorium* Lamarck. Swainson included under his genus two species. One was *Bicatillus extinctorium* Swainson, which he based on what Sowerby (Genera of Shells, *Calyptraea* 1824, fig. 3) had called *Calyptraea extinctorium*?. This is not Lamarck's species but is apparently *Crucibulum imbricatum* Sowerby. The other species listed by Swainson was *B. deformis* DeFrance from the Miocene of Bordeaux, France. This species was chosen as the genotype in 1846 by Herrmannsen (Index Gen. Malac., vol. 1, p. 112), the earliest type designation I have been able to find, and so this name will have to be restricted to the Miocene species *Bicatillus deformis* DeFrance and its varieties (see Cossmann and Peyrot, Conchologie Neogenique Aquitaine, vol. 3, Livr. 3, 1919, pp. 496-497, 500).

For the recent species from the Indian Ocean and Malaysian region I am proposing the subgenus:

Desmaulus, new subgenus.

Genotype: *Calyptraea extinctorium* (Lamarck) Blainville (Manual de Malac., 1825, pl. 48 bis, fig. 8).

This group differs from typical *Bicatillus* in that the free margin of the internal lamella is folded over, forming a straight, hollow, somewhat flattened, cornucopia-like tube. In the Miocene group the free edge of the somewhat shorter lamella is merely slightly thickened. The muscle scar in *Bicatillus* is elongate, while in *Desmaulus* it is irregularly circular.

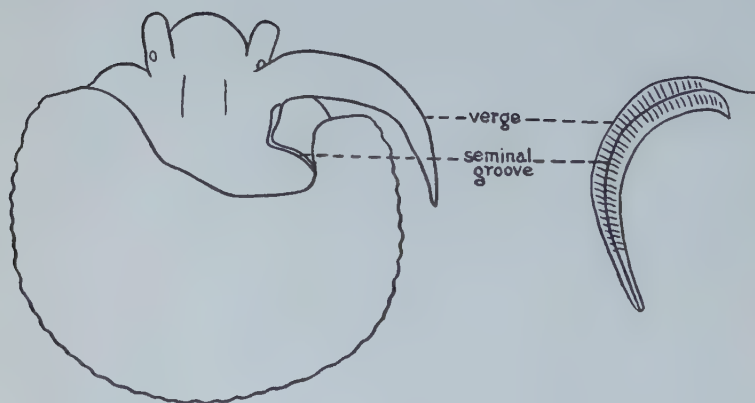
I am basing the genotype on Blainville's figure of *extinctorium*, as Lamarck's original description is unsatisfactory and Delessert's figure of this species (Receuil Coq. Lamarck, 1821, pl. 25, fig. 2.) is not very good.



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2



RADULAE AND GENITALIA OF THE GENUS *TROCHITA*.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW BIRDS FROM TROPICAL AMERICA.

BY W. E. CLYDE TODD.

In the course of identifying the Kingfishers and Motmots in the collection of the Carnegie Museum there has been discovered in each family one form which appears to have been heretofore unrecognized, and for which names are supplied herewith.

Chloroceryle inda chocoensis, subsp. nov.

Type, No. 65,979, Collection Carnegie Museum, adult male; El Tambo, Chocó, Colombia, April 1, 1918; M. A. Carriker, Jr.

Subspecific characters.—Similar to *Chloroceryle inda inda* (Linnæus) of tropical South America in general, but coloration of underparts richer and deeper (mahogany red, instead of burnt sienna or Sanford's brown); upperparts with the sheen more bluish, less greenish; and tail averaging shorter.

Range.—Western Columbia (and western Ecuador?).

Remarks.—This species of kingfisher is not common anywhere but appears to be remarkably constant in characters throughout its extensive range. The only variations noticeable are due to sex and age. Only in western Colombia is any geographical variation in evidence. Our three specimens from the Chocó region appear to constitute a slightly differentiated race, whose characters are better marked in the female. Eight males of true *inda* from eastern South America have tails from 60 to 67 mm. long (average, 63.6). Two males of the present form, 58, 59 mm. Presumably, the range of this form extends to western Ecuador, since Chapman (Bulletin American Museum of Natural History, 55, 1926, 269) remarks on the deeply colored underparts of his specimens from that region. From the Oyapock River, northern Brazil, we have one male (no. 68,274) which is a good match for the western Colombian specimens in the color of the underparts, but the tail is much longer and the upperparts are greener.

While I thus have no trouble in discriminating a race of *Chloroceryle inda* from western Colombia, I must confess my inability to recognize a

race of *C. americana* from the same region, as proposed by Laubmann (Anzeiger Ornithologischen Gesellschaft Bayern, No. 7, 1922, 51). He bases his new form (*hellmayri*) mainly on the character of having less bronzy green spotting on the under tail-coverts. I cannot see that this is true of our specimens (two only) from western Colombia, and I find that it is a variable character in our series as a whole. Indeed, Chapman (*l. c.*) expressly says that "the lower tail-coverts in our 40 Peruvian specimens average as much spotted as in *americana*"—and *hellmayri* is alleged to be intermediate between *cabanisi* and *americana*.

***Baryphthengus martii costaricensis*, subsp. nov.**

Type, No. 23,891, Collection Carnegie Museum, adult male; Cuabre, Rio Sicsola, Costa Rica, February 27, 1904; M. A. Carriker, Jr.

Subspecific characters.—Similar to *Baryphthengus martii semirufus* Sclater of Colombia, but larger; upperparts brighter green; tail bluer basally; and under tail-coverts and inner webs of the tertiaries with more blue sheen.

Range.—Nicaragua and Costa Rica.

Remarks.—Costa Rica birds of this species, as shown by Ridgway's tables of measurements as well as my own, are uniformly larger than those from Colombia; the tail in particular is longer. Four males from Colombia measure; wing, 142–148; tail, 225–265; bill (exposed culmen), 41–49; tarsus, 31–33. Three females: wing, 138–146; tail, 240–253; bill, 44; tarsus, 29–31. Three males from Costa Rica, on the other hand: wing, 154–155; tail, 284–315; bill, 47–52; tarsus, 31–34. Four females: wing, 147–153; tail, 250–288; bill, 45–48; tarsus, 30–32. They differ also in color; the upperparts are rich grass green (as against the duller hellebore green of the Colombian specimens); and there is a decided blue sheen on the wings, tail, and under tail-coverts. These differences are obvious and constant in the series examined and will suffice for subspecific separation. It is strange that Ridgway did not take this step. Although the type-locality of *semirufus* Sclater is uncertain, it is unlikely that his bird could have come from Costa Rica. According to Ridgway Panama birds of this species are as small as Colombian examples, but I do not know what their color characters are.

PROCEEDINGS
OF THE
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A NEW *HYLELLA* FROM MEXICO.

BY EDWARD H. TAYLOR,

Department of Zoology, University of Kansas.

From a bromeliaceous plant in a tree, in the northern part of the state of Morelos, México, I obtained a single specimen of a small hyloid frog which I refer to the genus *Hylella*. I dedicate the species to the ancient people, a vestige of whose civilization is represented by the ruins of a temple on a crag close to the type locality.

Hylella azteca, sp. nov.

Type.—EHT-HMS No. 17525, collected at Tepoztlan, Morelos; summer, 1938, by E. H. Taylor.

Diagnosis.—A small hyloid frog having toothless vomers and a vocal sac; tympanum more than half diameter of eye; toes nearly completely webbed, the terminal pads larger than in *Hylella sumichrasti*; a prominent, compressed tarsal fold; under surface of arm granular.

Description of the type.—A small, flatheaded frog, the width of the head (8.2 mm.) greater than its length (7.1 mm.); snout with an indistinct canthus rostralis; eye small, the diameter (2.3 mm.) much less than the length of the snout (3.5 mm.); width of the upper eyelid (2.1 mm.) very much smaller than the interorbital width (3.4 mm.); tympanum rather large, very distinct, its diameter (1.3 mm.) more than half the length of eye (2.3 mm.), which is very minutely less than distance between eye and nostril; regions about nostrils swollen, with a distinct depression between; loreal region not concave, but sloping rather abruptly to edge of mouth; posterior part of jaws somewhat outflaring, leaving the tympanum in a sloping, rather than in a vertical, position.

Tongue subcircular, adherent save along the posterior edge, which is free, and without emargination posteriorly; slits to the vocal sac, large (2.3 mm.). Choanae moderately large, widely separated, without any trace of an elevation on the vomer, or trace of teeth; the palatal groove nearly straight, as long as the distance between choanae, and closer to them than to the anterior end of palate; openings of the eustachian tubes larger than choanae.

On dorsal surface, the skin is smooth, lacking tubercles or pustules; under the lens, however, the skin appears minutely wrinkled or corrugated; a thickened fold begins behind eye, crosses the upper edge of tympanum where it turns down and disappears above arm. (It is impossible to say whether there is a continuous lateral fold to groin as in *H. sumichrasti* since the skin is loose on one side, and drawn tight on opposite side; however, if it is present it is much less distinct than in *H. sumichrasti*.) There is a small, but distinct axillary web attaching midway on upper arm; throat, chin, breast and abdomen strongly granular, as well as under surface of arm and the greater part of the ventral and posterior parts of the femur.

Arm moderately long, the digits with strongly dilated disks; digits about $\frac{1}{3}$ webbed between the three outer fingers; between first and second fingers the web a mere fringe; a thickened fold on outer side of fourth finger and hand; distal subarticular tubercle of fourth finger bifid; other tubercles single, rather small; a large, elongate tubercle at base of first finger which is more or less continuous with the larger nuptial pad which bears a minutely granular surface (doubtless horn covered during the breeding season); a more or less trifid palmar tubercle; undersurface of palm with irregular tuberculations; a row of elongate rounded tubercles under forearm.

When the leg is extended, the tibiotarsal articulation reaches the eye; toes two-thirds webbed, the membrane touching the terminal disks on outer side of first and second toes and narrowly failing to reach the disk on the outer surface of third and inner edge of fifth save as a narrow fringe; a large inner metatarsal tubercle; the outer if present not distinguishable from the supernumerary granules or tubercles; a strongly elevated tarsal fold; anal region with small anal flap, the skin behind distinctly fluted; no specialized anal tubercles.

Color.—Above grayish to leaf green, somewhat yellowish cream on ventral surface; in alcohol, grayish, somewhat lighter on sides; dorsal and posterior part of femur stippled with pigment; ventral surfaces immaculate; tympanum colored like surrounding skin.

Measurements in millimeters.—Snout to vent, 25; width of head, 8.2; length of head, 7.1; arm, 14; leg, 37; tibia, 12.3; foot, 16.2;

Comparisons.—Probably most closely related to *Hylella sumichrasti*, but differing in having a vocal sac. The chin is more strongly granular. The under surface of the arm has irregular granules while it is smooth in *sumichrasti*. The lateral dermal fold, if actually present is much less developed than in *sumichrasti*. The pads on digits are a little larger, and there is no trace of an elevation, or teeth, on prevomer.

It is more distantly related to *Hylella picta*, a terrestrial species. It differs from this in having a flat, broad head and a high tarsal fold; in *H. picta* there is no fold and the head is not widened.

There is a similarity in the general form to *Hyla smaragdina*, a bromelicolus form from the western plateau region. The head of the *Hyla* is not flattened or widened, and the vocal sac is absent. Vomerine teeth

are wanting or greatly reduced. There is a lateral skin fold. It may be necessary to refer this latter species to *Hylella*.

Remarks.—The habitat of this species is in bromelias. I strongly suspect that in its entire life history it is largely confined to this type of arboreal habitat. While it is known only from the type locality, I suspect that it will eventually be found to have a rather wide distribution along the southern flanks of the plateau.

In a large series of *Hylella sumichrasti* from Oxaca I found occasional specimens with an elevation on each prevomer. In two specimens the elevations bore one or two teeth. Presuming that *Hylella* is a derivative of *Hyla* it is not altogether surprising that teeth should appear occasionally.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THREE NEW ACANTHACEAE FROM PANAMA.¹

BY E. C. LEONARD.

The present paper contains descriptions of three new species of Acanthaceae collected recently in the Department of Coclé, Panama, by Paul H. Allen. One of them is a peculiar shrubby *Ruellia* with purplish black flowers, another belongs to the genus *Aphelandra*, and a third to *Beloperone*.

Ruellia anthracina, Leonard, sp. nov.

Frutex, caulibus puberulis vel glabratiss; lamina foliorum ovata vel oblongo-ovata, subacuta, basi angustata, in petiolum decurrens, glabra, costa et venis brunneo-puberulis; petioli puberuli; spica terminalis grandis, rhachi puberula; bracteae grandes, imbricatae, oblongae, acutae, basi angustatae, tenues, virides, costa et venis puberulis; bracteolae longae, lineari-lanceolatae, acuminatae, basi angustatae; calyx puberulus, segmentis linearibus acuminatis; corolla anthracina, glanduloso-pubescent, hypocrateriformis, curvata, lobis brevibus rotundatis, emarginatis; stamina inclusa; capsulae clavatae, brunneo-puberulae; semina brunnea, plana, glabra.

Shrub up to 2.5 meters high; branches puberulous or glabrate; leaf blades ovate to oblong-ovate, up to 27 cm. long and 15 cm. wide, acutish, narrowed at base and decurrent on the petiole, glabrous except as to costa and veins (8 to 12 pairs), these brown-puberulous, the cystoliths minute and inconspicuous; petioles up to 6 cm. long, puberulous; flowers borne in terminal and subterminal spikes up to 27 cm. long, the rachis puberulous, the bracts imbricate, oblong, up to 6 cm. long and 3 cm. wide, acute, narrowed at base, sessile, thin, green, the costa and veins puberulous; bractlets linear-lanceolate, up to 27 mm. long and 5 mm. wide, acuminate, narrowed at base, the costa and veins puberulous; calyx puberulous, the tube 2 mm. long, the segments linear, 18 to 20 mm. long, 2 to 2.5 mm. wide, acuminate; corolla 7 cm. long, glossy purplish black, finely glandular-pubescent, curved, the lower half of the tube slender, about 2 mm. in diameter, gradually enlarged from middle to

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about 1.5 cm. at throat, the limb slightly irregular, the lobes short, rounded, emarginate; ovary, style, and filaments puberulous; stamens included; anthers 7 mm. long, the cells glabrous, the connective dorsally puberulous; capsules clavate, 20 to 27 mm. long, up to 7 mm. broad and 5.5 mm. thick (the lower half solid, the enlarged seed-bearing upper portion slenderly pointed), brown-puberulous, 8-seeded; seeds dark brown, suborbicular, flat, 5 mm. long, 4.5 mm. wide, glabrous.

Type in the U. S. National Herbarium, no. 1,823,493, collected on trail to La Mesa, in the hills north of El Valle de Antón, Province of Coclé, Panama, altitude about 1,000 meters, September 2, 1941, by Paul H. Allen (no. 2732). Allen's 2327, collected January 21, 1941, at the same locality is also this species.

The glossy, purplish black flowers and the glabrous seeds of *R. anthracina* are unique characters in the genus *Ruellia*. Its large thin bracts suggest possible relationship to a red-flowered, red-bracted species, *R. colorata* Baill., from Colombia.

Aphelandra gracilis Leonard, sp. nov.

Frutex vel arbor parva, caulibus minute strigosis; lamina foliorum lanceolata vel oblongo-lanceolata, acuminata, basi angustata, in petiolum decurrens, glabra, costa et venis minute strigosis; spicae graciles, laxae; rhachis parce puberula; bracteae ovatae, subacutae, medio glandulas sessiles submarginales parvas gerentes, extus pubescentes, intus glabrae, ciliolatae; bracteolae lanceolatae, acuminatae, minute pubescentes, striatae; calycis segmenta lanceolata, acuminata, striata; corolla hypocrateriformis, coccinea, puberula, bilabiata, labio superiore erecto, bilobo, lobis triangularibus, acuminatis, inferiore patulo, trilobo, lobo mediano longo, lanceolato, lateralibus minutis, rotundatis; capsulae clavatae, glabrae, minute punctatae.

Shrub or small tree up to 6 meters high; branches minutely strigose or the lower glabrate, the cystoliths conspicuous; leaf blades lanceolate to oblong-lanceolate, up to 16 cm. long and 6 cm. wide, acuminate (the tip blunt), narrowed at base and decurrent on the petiole, glabrous except as to costa and veins (8 to 10 pairs), these more or less minutely appressed-pubescent; flowers spreading, geminate, borne on 1 to several slender terminal or subterminal spikes up to 12 cm. long, the rachis sparingly puberulous, the internodes mostly 6 to 8 mm. long; bracts ovate, up to 8 mm. long, 4.5 mm. wide, acutish, pubescent without, glabrous within, ciliate, bearing on either side of the costa several small, sessile, elliptical glands; bractlets lanceolate, 7 mm. long, 2 mm. wide, acuminate, sparingly and minutely pubescent without, sparingly ciliate, subcarinate, striate, the margins hyaline; calyx about 8 mm. long, subglabrous, divided nearly to base, the segments lanceolate, 1.5 to 2 mm. wide, acuminate, striate; corolla scarlet, puberulous, more or less curved, 5 to 5.5 cm. long, about 2 mm. in diameter at base, about 6 mm. at throat, the lips 2 cm. long, the upper lip erect, 2-lobed, the lobes triangular, 9 mm. long, 4 mm. wide at base, acuminate, the lower lip spreading, the middle

lobe lanceolate, 18 mm. long, about 5 mm. wide, acute, the lateral lobes ovate, about 1 mm. long; capsules clavate, 22 mm. long, 6.5 mm. broad, 4.5 mm. thick, glabrous, minutely punctate, 4-seeded; mature seeds not seen.

Type in the U. S. National Herbarium, no. 1,821,401, collected north of El Valle de Antón, Department of Coclé, Panama, altitude 1,000 meters, January 13, 1942, by Paul H. Allen (no. 2908); no. 1,821,402 is an isotype. Allen's 2300 and 2301, collected January 21, 1941, at the same locality, are also this species.

Aphelandra gracilis is related to *A. pulcherrima* (Jacq.) H. B. K., of northern South America, but is easily distinguished by its nearly glabrous leaf blades and slender lax spikes. In *A. pulcherrima* the leaf blades are softly pubescent, at least beneath, and the bracts closely imbricate.

***Beloperone Allenii* Leonard, sp. nov.**

Frutex vel suffrutex, caulibus glabris vel ad nodos parce et minute pubescentibus; lamina foliorum oblonga, breviter acuminata, basi angustata, in petiolum decurrens, costa et venis perspicuis; inflorescentia terminalis vel axillaris, pedunculo communi spicas 2 vel 3 apice gerente, bifariam hirtello sicut pedunculis secundariis, floribus secundis, approximatis; bracteae et bracteolae floriferae triangulares, acutae, puberulae; calycis segmenta lanceolata, glanduloso-puberula; corolla incarnata, glanduloso-pubescent, bilabiata, labiis aequalibus, superiore trilobo, lobis minutis, obtusis, inferiore trilobo, lobis rotundatis; ovarium glabrum.

Shrub or woody herb up to 1.5 meters high; branches glabrous or sparingly and minutely pubescent at the nodes; leaf blades oblong, up to 15 cm. long and 6.5 cm. wide, short-acuminate (the tip blunt), narrowed at base and decurrent on the petiole, glabrous, the costa and veins (12 to 16 pairs) rather prominent, the cystoliths numerous but minute and inconspicuous; inflorescence terminal or axillary, the common peduncles about 4 cm. long, bearing at apex 2 or 3 spikes, each 2 to 3 cm. long, the secondary peduncles about 1 cm. long, these and the common peduncles hirsutulous in 2 lines, the flowers secund, approximate; bracts at the apex of the common peduncles linear, 6 to 7 mm. long, 0.5 mm. wide, obtuse; bracts subtending the flowers triangular, 5 mm. long, 1.5 mm. wide at base, acute, puberulous without, the costa rather prominent, the veins small and inconspicuous; bractlets similar to the bracts but slightly smaller; calyx glandular-puberulous, deeply segmented, the segments lanceolate, about 10 mm. long, 2 to 2.5 mm. wide at base, acuminate, ciliolate; corollas bright pink, finely glandular-pubescent, 3 to 4 cm. long, gradually enlarged from 2 mm. at base to about 6 mm. at throat, 2-lipped, the lips about equal, the upper one 2-lobed, the lobes small, 1 mm. long, obtuse, the lower lip 3-lobed, the lobes subequal, rounded, the middle lobe 3.5 mm. wide, the lateral ones about 3 mm. wide; stamens barely exerted, the anther lobes approximate, superposed, the upper one apiculate at base, the lower one terminating in a blunt curved spur 1 mm. long; ovary glabrous; style 4 cm. long, minutely pubescent, the stigma 2-lobed, the lobes minute, conical; fruit not seen.

Type in the U.S. National Herbarium, no. 1,823,485, collected in hills north of El Valle, Province of Coclé, Panama, altitude 800 to 1,000 meters, January 2, 1941, by Paul H. Allen (no. 2285); isotype, no. 1,823,729.

Apparently unrelated to any other Central American or Panamanian member of the genus. It is said by the collector to be a fairly common undershrub along trails.

PROCEEDINGS
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A NOTE ON RAFINESQUE'S FLORULA COLUMBICA.

BY ELBERT L. LITTLE, JR.,

Forest Service, United States Department of Agriculture.

In connection with the current work on a new Washington-Baltimore flora by the Conference on the District Flora, it may be of historical interest to recall that the first local flora of the District of Columbia was an unpublished and now lost manuscript, *Florula Columbica*, prepared in 1804 by Constantine S. Rafinesque (1783-1840), when he was only about twenty-one years old.

Rafinesque, a brilliant but eccentric genius and naturalist, was ignored by his contemporaries. However, his work, both good and bad, is now becoming more fairly evaluated and better appreciated. One of the greatest splitters in the history of American botany, he described very briefly hundreds of new genera and thousands of new species of plants of eastern United States and added to the confusion of nomenclature. The *Florula Columbica* was written on his first trip to the United States, from April 1802 to December 1804. After spending the next ten years in Sicily, Rafinesque returned to the United States in 1815 and made this country his home until his death in 1840.

Not much information about Rafinesque's lost *Florula Columbica* is available, and its contents are almost completely unknown. However, additional notes and papers of Rafinesque are still being located. The discovery of some very interesting records of Rafinesque after 1815, including manuscripts, notebooks, and letters, was reported by Pennell

(13) in 1940. If found, Rafinesque's *Florula Columbica* would now be of more interest historically than scientifically.

HISTORICAL ACCOUNTS AND BIBLIOGRAPHIES.

The District of Columbia was established by act of Congress in 1790 and became the seat of government of the United States in 1800. In 1805 there appeared in the *Philadelphia Medical and Physical Journal*, edited by Dr. Benjamin Smith Barton, the following brief announcement (1) of six lines under "Miscellaneous Facts and Observations," subheading "Botany:"

"25. Mr. Rafinesque, an Italian gentleman, has put into the hands of the Editor, a MS. catalogue of the plants of the State of Delaware, and of the District of Columbia. This catalogue, with large additions by the Editor, will be published in future parts of this *Journal*."

McAtee (9, p. 16), in his sketch of the natural history of the District of Columbia, stated in a footnote:

"Rafinesque informs us (Rafinesque, C. S. Circular address on Botany and Zoology, followed by the Prospectus of Two Periodical Works; *Annals of Nature and Somiology of North America*. Philadelphia, 1816, page 12) that he prepared a *Florula Columbica*, or catalogue of the plants found in the District of Columbia, 1804, which he gave Dr. B. S. Barton for insertion in the *Philadelphia Medical and Physical Journal*. Dr. Barton acknowledged (op. cit. II, 1806, p. 177) this to be a fact and promised to publish the catalogue with additions—a forecast never fulfilled."

In his very thorough history of botanical activity in the District of Columbia, Ricker (26, p. 489) made only the following brief reference to Rafinesque's manuscript, citing Fitzpatrick (6) as authority:

"Constantine Samuel Rafinesque-Schmaltz prepared the first list of District plants in 1804, the forthcoming publication of which was announced by him in 1805, but for some unknown reason it never appeared."

Asa Gray (7, p. 225) in reviewing at length the botanical publications of Rafinesque shortly after the latter's death, made only the following brief reference to the *Florula Columbica*:

"We do not include the following tracts, which Rafinesque has enumerated among his works, since they have never been published, viz:—*Florula Delawarica*, a Catalogue of plants found in Delaware; and *Florula Columbica*, or a Catalogue of plants found in the District of Columbia; both sent in 1804 to the *Medical and Physical Journal*, edited by Prof. Barton. ..."

Fitzpatrick (6, p. 67) in his complete bibliography containing 939 published articles by Rafinesque listed as fourth in chronological order and the first botanical title, the following announcement, and added a suggestion about the reason the manuscript was not published:

"4. [RAFINESQUE, C. S. Announcement of a catalogue of the

plants of the State of Delaware and of the District of Columbia.] The Philadelphia Medical and Physical Journal by Benjamin Smith Barton, vol. II, Part I, p. 177. Philadelphia, 1805.

"Rafinesque frequently claimed that the editor, Doctor Barton, suppressed the publication of this catalogue contrary to his promise, and apparently the claim is well founded."

RAFINESQUE'S OWN LISTS OF HIS WRITINGS.

Rafinesque mentioned his manuscript *Florula Columbica* in several lists of his writings but never did publish it. It is not clear from his references whether the *Flora Delawarica* was combined in the same catalog, as Barton indicated, or whether there were two separate articles. Circular address on botany and zoology (20, p. 12), his first publication after his return to the United States, contained a list of all his works and tracts up to that date, 1816. Following a description of four new species of birds from Java, published in 1803, and "Several communications on birds and reptiles," he listed his first two botanical articles:

"*Florula Delawarica*, or a Catalogue of the Plants found in the State of Delaware. This tract and the following were given to Dr. Barton in 1804, for insertion in his Medical and Physical Journal, and he promised to do so, volume II, page 177; but never performed his promise.

"*Florula Columbica*, or a Catalogue of the Plants found in the District of Columbia. 1804."

He explained further (20, p. 6) that all his books, manuscripts, drawings, herbarium, etc., "the fruit of twenty years labours, exertions and travels," were lost when his ship from Europe was wrecked off the Connecticut coast as he landed in 1815. It was planned to rewrite several of the lost manuscripts, including "all those relating to the United States." Thus, if Rafinesque kept a copy of the manuscript *Florula Columbica*, it probably was lost in the tragic shipwreck. If he saved a copy, he probably would have published it without further delay, upon his arrival in this country.

In the same publication Rafinesque described his proposed elaborate work, *Somiology of North America*, which would contain descriptions and illustrations of every species of plants and animals in the United States and adjacent countries. It was to be moderately priced and could be purchased in parts or sets, according to the interests of the subscribers. He listed 115 sets, mostly on the flora and fauna of certain localities. Under "Sets of the local floras and faunas," he (20, pp. 34-35) listed as the principal local floras and faunas likely to be asked, those of twelve leading cities, adding, "the Plants and Animals of those noted so† are already pretty well known." The two of interest here are:

"95. *F.* [Flora and] *F.* [Fauna] *Baltimoriana*.† Of Baltimore."

"97. *F.* [Flora and] *F.* [Fauna] *Columbica*.† Of the District of Columbia."

Some of Rafinesque's manuscripts and proposed works, such as the *Somiology of North America*, mentioned in his publications apparently

never were written, as he frequently changed his interests before completing certain studies. However, there is a definite, published notice of acceptance by the editor of Rafinesque's manuscript catalogue of the plants of Delaware and the District of Columbia.

Rafinesque's Circular address on botany and zoology, containing the above quotation about his first two botanical articles, was reprinted in English in a German periodical in 1819 (21, p. 58). Likewise, his prospectus of the Somiology of North America was quoted in the following issue (22).

In 1814 Rafinesque (17) published his "Precis des decouvertes et travaux somiologiques," which listed on the covers his published works, without mentioning the *Florula Columbica*. A reprint of the botanical portion of that publication with editorial remarks by N. A. Desvaux (18, pp. 176-177 [276-277]) listed also Rafinesque's botanical publications but not the manuscripts. His book, *Analyse de la nature* (19), published in 1815, contained on the cover pages lists of his works and essays with brief French summaries of some, including:

"2. *Florula Delawarica et Florula Columbica*—Catalogue des Plantes de l'État de Delaware et du district de Columbia dans les États Unis d'Amérique, communiqué au Doct. Barton pour insérer dans le *Journal de Physique de Philadelphie* en 1805."

Again in 1833 Rafinesque in his *Herbarium Rafinesquianum* (23, pp. 33-37), published another list of his works, Chronological index of the principal botanical works and discoveries published by C. S. Rafinesque. On page 34 he listed:

"1804. *Floras of Delaware and District of Columbia*, my first essay, suppressed by Dr. Benjamin Barton."

NOTES FROM RAFINESQUE'S AUTOBIOGRAPHY.

A few details about Rafinesque's study of the plants of the District of Columbia in 1804 may be inferred from his autobiography (24). The biographies by Call (4) and Fitzpatrick (6) added no details, and the former did not even mention this manuscript flora. The second chapter of the autobiography was devoted to his travels in the United States during the three years 1802 to 1804, when Philadelphia was his home. He wrote that he became gradually acquainted with all the botanists of that period, including Pursh, Barton, Muhlenberg, Bartram, Marshall, the younger Michaux, and others. In the spring of 1804, Rafinesque left his position as a secretary in Philadelphia and, foreseeing that he might have to leave America, gave himself "up to Botany and travels during the whole year." The enthusiasm with which the twenty-year old scientist began his botanical field trips in 1804 is shown in his autobiography (24, p. 18):

"My pedestrian excursions of the last year [1803] had given me a relish for these rambles; I had become convinced that they were both easy, useful and full of pleasure, while they afforded me the means to study every thing at leasure. I never was happier than when alone in the

woods with the blossoms, or resting near a limpid stream or spring, I enjoyed without control the gifts of Flora, and the beauties of nature. I therefore resolved to undertake this year longer journeys before I left America, where I foresaw that I could not remain to advantage, as I often threw my eyes towards Greece and Asia, as another field of exertions and discoveries."

Apparently the *Florula Columbica* and *Florula Delawarica* both were prepared in 1804 from collections and notes made on field trips in that year. During 1804 he walked 1,200 miles on various field trips from Philadelphia into Delaware, Maryland, Virginia, and to the Allegheny Mountains in Pennsylvania. When he returned to Europe at the close of the year, he took with him his herbarium containing 10,000 specimens representing nearly 2,400 species. Carrying letters of introduction on his trips, he was treated with great hospitality. Though offered horses to ride, he preferred to travel alone and on foot by small stages of ten to twenty miles a day. The study of plants of the District of Columbia apparently was confined to a trip to Maryland and Virginia in July and August. From Baltimore he went to Washington. Of his brief notes about Washington, the following quotation (24, p. 21) may be of interest:

"Mr. Law invited me to dwell with him. I was introduced to the President of the United States, Jefferson, for whom Mr. Logan, Senator of Pennsylvania, had given me a letter, and who invited me to visit him at Monticello, where I could not then go. I was also introduced to Gen. Dearborn, Secretary of War, Mr. Madison, Secretary of State and since President, Dr. Thornton, &c. * * *

"I collected many rare and new plants at the falls of the Potowmack. I went to Alexandria to visit the herbal of Hingston, who gave me several rare plants. The heat becoming oppressive I returned to Baltimore and Havre de Grace by a different road."

Brief references to Rafinesque's early botanical studies in the District of Columbia were found also in his *New flora and botany of North America* (25, part 1, p. 7). He summarized his early field trips, as follows:

"I came to North America in 1802, and travelled chiefly on foot until 1804, over New Jersey, Pennsylvania, Delaware, Maryland, and Virginia, from the Alleghany Mountains beyond Easton, to the Potomac beyond Washington and Alexandria. Some of the results of my discoveries in those three years of early travels were published in 1808."

The falls of the Potomac River, at the District of Columbia, were among twenty botanically interesting localities listed by Rafinesque on page 28 as first explored by himself. He wrote:

"Besides these great localities I will add several smaller localities of great botanical interest by the numerous new plants which they have afforded me. Every botanist knows some similar place; but those which I may boast to have discovered or first well explored deserve to be commemorated. They are

"* * * 10. Falls of the river Potomac. * * *"

CONTENT OF THE MANUSCRIPT.

A search of other early publications of Rafinesque, as well as those of Benjamin Smith Barton, was made with the hope of finding some information about the species contained in the lost manuscript. Seven species were found.

Ricker (26, p. 519) in his bibliography of works on taxonomy of plants of the District of Columbia cited two of Rafinesque's publications, in which a total of five species were recorded from Washington. Doubtless the five were also in Rafinesque's manuscript catalog. The first article (15, p. 360) mentioned two new species from this area, *Ceanothus* [*Ceanothus*] *herbaceus* from "near the falls of the Potowmack, between the rocks," and *Euphorbia uniflora* from "between Baltimore and Washington." The second article (16, pp. 339, 342), a list of about 250 naturalized species in the Middle States (New York, Pennsylvania, New Jersey, Delaware, and Maryland), mentioned cities where the species were found, except for the commonest ones. There were a number from Baltimore, Annapolis, and other places in Maryland, but only these three mentioned definitely from Washington: *Agrostemma coronaria*, *Aquilegia vulgaris*, and *Echium vulgare*. Examination of other articles by Rafinesque published before 1815 revealed no more species recorded from Washington.

The identity of *Ceanothus herbaceus* Raf. (Med. Repository 11: 360. 1808) is uncertain. The brief, original description is quoted in full:

"*Ceanothus herbaceus*; stem annual; leaves ovate semi-serrated smooth, flowers in a terminal thyrsus; grows near the falls of the Potowmack, between the rocks."

Evidently he took this low shrub growing in the rocks to be an annual herb. The generic spelling was later corrected by Rafinesque (Jour. de Phys., Chim. 89: 258. 1819). In his Monograph of *Ceanothus* (New Fl. Bot. No. Amer. 3: 54-58. 1836), he gave a more detailed description with the following note on distribution (p. 55):

"Virginia and Carolina near streams, disc. by Hingston in 1800 at the falls of the Potowmack, where found by me again, * * *"

Standley (8, p. 201), in recording *Ceanothus ovatus* Desf. from flats about Little Falls of the Potomac River, remarked that plants from this region were described by Rafinesque as *Ceanothus herbaceus*. The name *Ceanothus ovatus* Desf. (Hist. Arbr. 2: 381, 382. 1809), published a year after Rafinesque's name, was also brief but was clearer and mentioned the differences from *Ceanothus americanus* L. McMin (Ceanothus, 175. 1942) in his monograph of the genus listed *Ceanothus herbaceus* Raf. as a synonym of *Ceanothus americanus* L. Thus it seems best not to adopt the name *Ceanothus herbaceus* Raf., which was almost a *nomen nudum* with a very short and partly erroneous description.

Barton (3) in his unfinished Flora Virginica cited one combined manuscript, "*Rafinesque, Florula Delavarica et Columbica, M. S.*," under two species, *Bartonia tenella* Muhl. on page 50, and *Bartonia verna*, a new

combination based on *Centaurella verna* Michx., on page 51. In listing the overlooked new species and new names in Barton's rare work, Pennell (12, p. 28) included: "* (p. 51) *Bartonia verna*—Rafinesque, *Florula Delawarica et Columbica*, M. S." Thus, one new combination of Rafinesque's manuscript, *Bartonia verna* (Michx.) Raf. ex Barton (1812) is correct today and replaces the same combination made a year later by Muhlenberg. As now understood, this species occurs neither in the District of Columbia nor in Delaware, but ranges from southern Virginia to Florida and Louisiana.

It is useless to speculate upon the further contents of Rafinesque's first botanical manuscripts, which obviously were not local floras in the modern sense of the term. In 1809 a second unpublished list of 224 species of plants of the District of Columbia and vicinity was prepared by Dr. Henry Muhlenberg. McAtee (10) reported the discovery of this list in an unpublished letter from Muhlenberg, who made the determinations, to Dr. John Ott, of Georgetown, D. C., one of the collectors. Rafinesque's *Florula Columbica* may have been comparable in size with Muhlenberg's list and the first lists published several years later and cited by Ricker (26, pp. 489-490). These were *Florula Columbiana* by Warden (27, pp. 191-209) in 1816, containing 20 pages and about 142 species, with determinations by José Francisco Correa da Serra, and the *Florula Columbiensis* in 1819 by the Washington Botanical Society (28), with 14 pages and 292 species. Oddly enough, Rafinesque's *Florula Delawarica* had no successors, and no flora of the State of Delaware has ever been published. However, local floras covering New Castle County, one of the State's three counties, have appeared.

BARTON AND RAFINESQUE.

Rafinesque's claim that Dr. Benjamin Smith Barton failed to publish the *Florula Delawarica* and *Florula Columbica* in the *Philadelphia Medical and Physical Journal*, as he had promised, indicates that from the beginning Rafinesque had difficulty in getting his manuscripts published. Possibly Rafinesque already at that early age was not on the best personal relations with other botanists, such as Dr. Barton, who was professor of materia medica, natural history, and botany in the University of Pennsylvania. Another explanation is that Dr. Barton was preparing a much more detailed flora to include the same areas. In the announcement of Rafinesque's (1) catalog, it was stated that there would be "large additions by the Editor." On the next page was a note by the editor (2) stating that he was preparing for publication his *Prodromus* of a flora of the States of New-York, New-Jersey, Pennsylvania, Delaware, Maryland, and Virginia. Pennell (14, p. 51) noted that Rafinesque's early papers were submitted to scientific journals and that these avenues of publication later became closed to him because of the sketchy nature of the manuscripts and the improbably high proportion of new names.

The lost manuscript may be located later with some of Barton's papers. In reporting upon a journal of a trip by Barton to Virginia in 1802,

McAtee (11) mentioned his search for Rafinesque's manuscript among papers of Benjamin Smith Barton preserved in the library of The Historical Society of Pennsylvania in Philadelphia. Violetta W. Delafield (5) reported in 1936 finding a chest containing papers, proof sheets, letters, drawings, etc., of Barton in the attic of a house which had belonged to Barton's daughter. Eugene L. Delafield, who has been studying this material and working on a bibliography of Barton writes me that there was one letter from Rafinesque to Barton in this collection.

I wish to acknowledge my indebtedness to Drs. Elmer D. Merrill, Francis W. Pennell, and E. H. Walker, for suggestions and citations.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RED SQUIRREL FROM MINNESOTA.

BY ARTHUR H. HOWELL.

This description of a previously unrecognized subspecies of red squirrel was found among the papers of the late Arthur H. Howell. It was prepared by him in connection with his revision of the red squirrels of North America, which was left uncompleted by his untimely death.—Viola S. Schantz.

Tamiasciurus hudsonicus murii, new subspecies

RED RIVER CHICKAREE.

Type.—Collected at Moorhead, Minnesota, February 11, 1918, by O. J. Murie; adult male, skin and skull, No. 234039, U. S. National Museum (Biological Survey collection); original number 1174 (21595X).

Range.—The Red River Valley, Minnesota and North Dakota, north in southern Manitoba to Aweme.

External characters.—Hind foot larger than in *loquax*; upper parts in winter pelage paler, the red of a paler shade, and sides paler and more grayish (less buffy); ear tufts more brownish (less red); under parts with more vermiculation. In summer pelage very similar to *loquax*, but red of tail averaging paler. Compared with *pallascens*: Upper parts in winter much brighter red—the red color concentrated in the middle line. Compared with *hudsonicus*: Upper parts in winter paler, the red concentrated in the middle line; under parts with less vermiculation; tail darker red and with darker buffy edgings. In summer pelage, upper parts more ochraceous (less olivaceous); front legs a deeper shade of ochraceous buff; tail darker and more reddish above.

Cranial characters.—Skull slightly smaller than that of *hudsonicus*, and relatively narrower across zygomata; slightly larger than that of *loquax*; similar in size to that of *pallascens*.

Color.—*Winter pelage* (type): Median portion of upper parts, from crown to rump, between ochraceous tawny and tawny, shaded on each side of middle line with light ochraceous buff; sides of head and body smoke gray; feet gray, slightly darker than sides; front of face ochraceous buff, mixed with dusky; eye ring dull white; tail above, light tawny,

bordered with black and tipped with warm buff; tail beneath, ochraceous buff mixed with gray; under parts white. *Summer pelage:* Upper parts clay color or ochraceous tawny; lightly mixed with black; front legs and feet ochraceous tawny; hind feet ochraceous buff; tail above, tawny, bordered with black and tipped with ochraceous buff; under parts white.

Measurements.—Average of 9 adults (7 males, 2 females) from type locality: Total length, 325 (314–344); tail vertebrae, 130.8 (119–141); hind foot, 50.2 (48–52). *Skull:* Average of 8 adults (7 males, 1 female) from same locality: Greatest length, 47.1 (46–48.3); zygomatic breadth, 26.6 (25.5–27.5); cranial breadth, 20.3 (19.9–21.1); interorbital breadth, 14.1 (13.3–14.7); least postorbital breadth, 14.4 (13.7–15.7); length of nasals, 14 (13–15.6); maxillary tooth row, 8 (7.5–.4).

Remarks.—In color, this race most resembles *loquax*, but it is distinctly paler and also larger. It is an intermediate form, connecting *loquax* with *palleszens* of the Souris River region.

Specimens examined.—Total number, 61, from localities as follows: Manitoba: Aweme, 17^{1,2}; Carberry, 3; Red River, 2.

Minnesota: Moorhead, 12³.

North Dakota: Grafton, 12; Grand Forks, 3; Larimore, 1; Lisbon, 1; Manvel, 1; Portland, 3; Wahpeton, 3; Walhalla, 3.

United States Department of the Interior, Fish and Wildlife Service, Washington, D. C.

¹ Stuart Criddle collection.

² Royal Ontario Mus. Zool.

³ Nine in collection Carnegie Mus.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

SOME EARLY BIRD-RECORDS FOR MARYLAND
AND THE DISTRICT OF COLUMBIA.¹

Through the courtesy of the Rev. Fr. Arthur A. O'Leary, S. J., sometime President of Georgetown College, the writer has recently been privileged to select from the century-old collection of mounted birds preserved at the College those specimens considered worthy of transference to the collection of the United States National Museum. The following have a special interest in relation to the local avifauna:

1. *Porphyryla martinica* (Linnaeus), U. S. Nat. Mus. no. 371327; adult male, collected in "D. C.," April 30, 1845; "deposited [at Georgetown College] by R. J. P[ollard]." Data (in Pollard's handwriting) taken from wooden stand.

2. *Numenius americanus americanus* Bechstein, U. S. Nat. Mus. no. 371328; adult female, collected in "St. Mary's Co. [Maryland]," September, 1843, by R. J. P[ollard]. Data (in Pollard's handwriting) taken from wooden stand.

3. *Nyctea scandiaca* (Linnaeus), U. S. Nat. Mus. no. 371326; adult female, collected (presumably locally) February 12, 1847, by R. J. Pollard. Data (in Pollard's handwriting) taken from wooden stand.

Pollard was a taxidermist and preparator for the National Institute and an active collector of the local birds; there is no good reason to doubt the evidence for the validity of these records.

Among specimens from farther afield, the Georgetown collection provides one more bit of inconclusive testimony for the former occurrence in the United States of *Guara rubra* (Linnaeus). An unsexed example, U. S. Nat. Mus. no. 371329, well preserved and still in good color, bore on the wooden stand a label inscribed "This Rubra | Scarlet Ibis | Florida," in an unidentified hand apparently identical with that which, in February, 1858, entered nos. 7993-8007 in the bird-catalogue of the Smithsonian Institution. The data, such as they are, bear a striking similarity to those given for the Charleston bird reported by Brewster (Bull. Nuttall Ornith. Club, vol. 8, 1883, pp. 185-186).

H. G. DEIGNAN.

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OCCURRENCE OF THE HUDSONIAN GODWIT IN
THE DISTRICT OF COLUMBIA.²

A period of heavy rain in August, 1933, ended on the 23rd or 24th of the month with flood conditions along the Potomac and numerous pools of standing water on the golf course of East Potomac Park, which for a number of days afforded a suitable habitat for migrating shorebirds. Mention of some of the unusual forms present was made, on authority of the present writer, by H. C. Oberholser in "The Season," [Washington (D. C.) Region], Bird-lore, vol. 35, no. 6, November-December, 1933, p. 328. Also observed but not reported, in the expectation that a note would appear elsewhere, was a species which is otherwise unrecorded as a member of the local avifauna.

This was an example of *Limosa haemastica*, the Hudsonian godwit, wearing almost full nuptial dress, first seen by me August 27th among the smaller species. Telephone calls to a number of members of the Audubon Society of the District of Columbia made it possible for a dozen or more interested people (including, among others now forgotten, Mrs. L. D. Miner and W. Howard Ball) to view the bird at the same spot under ideal conditions on the morning of the 28th. While still under observation and without obvious cause, it rose and disappeared into the sky in the direction of the Army War College.

H. G. DEIGNAN.

TWO PREOCCUPIED NAMES OF ORIENTAL BIRDS.³

The Chinese race of the scarlet-backed flower-pecker, *Dicaeum cruentatum*, has, even by quite recent authors, been called *D. cr. coccineum*, with reference to *Certhia (coccinea)* Scopoli, Delic. Flor. Faun. Insubr., pt. 2, 1786, p. 91 (China, *ex* Sonnerat).

This name cannot be employed since it is preoccupied by [*Certhia*] *Coccinea* J. F. Blumenbach, Handbuch der Naturgeschichte, 2nd ed., 1782 p. 190, and also by *Certhia Coccinea* G. Forster, Göttinger Mag. Wissensch., vol. 1, pt. 6, 1780 or 1781, p. 347, each of which equals *Vestiaria coccinea* (G. Forster) of the Hawaiian Islands.

The name next available seems to be [*Certhia*] *erythronotos* Latham, Index Ornithologicus, vol. 1, 1790, p. 290 (China, *ex* Sonnerat).

For *Tribura luteoventris saturatus* [*sic*] Ticehurst, Ibis, 1941, p. 318

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(Thayetmyo-Minbu border, 5,000 feet, Southern Chin Hills, Burma), not *Tribura thoracica saturata* Yen, Ornith. Monatsber., 1933, p. 16 (Yao-shan, Kwangsi), I propose

***Bradypterus luteoventris ticehursti*, nom. nov.**

Delacour has noted (Ibis, 1943, p. 35) that Ticehurst's name cannot be used but, doubting the validity of the form, has neglected to re-name it. A single winter specimen from the mountains of northern Siam, however, is distinct from both *luteoventris* and *russulus* and agrees perfectly with Ticehurst's description of this putative race.

H. G. DEIGNAN.

**HOYT'S HORNED LARK ON THE EASTERN SHORE,
MARYLAND.⁴**

An adult male of *Eremophila* (*Chionophilos*) *alpestris hoyti* was collected at Cambridge, Dorchester county, Maryland, February 4, 1918, by Ralph W. Jackson, who presented it to the United States National Museum in 1920, together with an example of *Eremophila a. alpestris* of the same place and date. The former is now registered as U. S. N. M. no. 256939. The specimen has at some time been identified and initialed by H. C. Oberholser but seems never to have been noticed in print. The race is not otherwise recorded from Maryland and has apparently not previously been found farther south than central Ohio and Long Island.

H. G. DEIGNAN.

THE EUROPEAN WIDGEON NEAR WASHINGTON.

In the Proceedings of the Biological Society of Washington for March 25, 1929, May T. Cooke, in her paper "Birds of the Washington, D. C. region," lists three records for *Mareca penelope* from the Washington, D. C. area. To these I would add a fourth, which, while, not coming precisely within the generally accepted confines, is yet near enough (forty miles distant) I believe to be recorded.

It is an immature male just coming into its full plumage. It was taken by myself on Nanjemoy Creek, Charles Co., Maryland, November 3, 1941.

E. M. HASBROUCK.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW COTTON RATS FROM FLORIDA

BY ARTHUR H. HOWELL.

These new cotton rat descriptions were found with the late Arthur H. Howell's partly completed manuscript on Florida mammals.—Viola S. Schantz.

Sigmodon hispidus floridanus, new subspecies.

FLORIDA COTTON RAT.

Type.—Collected at Canal Point, Palm Beach County, Florida, March 1, 1936, by A. H. Howell; female adult, skin and skull, No. 261624, U. S. National Museum (Biological Surveys collection); original number 2813.

Range.—Greater part of central Florida (except coastal beaches), from Orange Lake south to the southern side of Okeechobee Lake.

External characters.—Coloration of upper parts darker (more blackish) than in *littoralis*; sides less heavily washed with buff; under parts more whitish (less buffy). Compared with *S. h. hispidus* of northern Florida and the Carolinas it is much darker and more blackish (less buffy).

Cranial characters.—Skull similar to that of *littoralis*; longer and relatively narrower across zygomata than that of *hispidus*.

Color.—Upper parts mixed black, grayish white, and pale buff; sides mixed grayish white and buff, the buff rather inconspicuous; hind feet neutral gray; tail dull blackish above, slightly paler beneath; under parts grayish white.

Measurements.—*Type* (adult female): Total length, 302; tail vertebrae, 112; hind foot, 32. *Skull*: Occipitonasal length, 38.1; zygomatic breadth, 21; cranial breadth, 15.9; length of nasals, 15; maxillary tooth row, 6.8.

Remarks.—Cotton rats are probably the most abundant of Florida mammals. They inhabit a variety of terrain but are most numerous in neglected fields grown up to briars and broomsedge, or in palmetto scrub. Although not as aquatic in habit as the rice rats (*Orzomys*) they often invade the marshes or mangrove swamps and are frequently found in moist woodland. On the coast they are said to feed on mangrove shoots.

When pineapples were grown extensively in Florida these rats proved to be a serious pest. They flocked into the plantations and cut the plants off near the surface in order to reach the roots, which they consumed. They also destroyed the fruit by biting a hole in one side and

tunnelling inwards, leaving only an empty shell. At present they cause serious damage to sugarcane in the big plantations around Okeechobee Lake, where they often become very numerous and where hundreds are killed by the use of strychnine bait.

These rats are partly diurnal, being frequently seen running about in daytime in grassy situations or even crossing the highways.

Specimens examined.—Total number, 155, from the following localities in Florida: Canal Point, 4; Canaveral, 2; Chester Shoal, 1; Citrus Center, 1; Eden (St. Lucie County), 1; Kissimmee, 44; Kissimmee River (Osceola County), 4; Labelle, 2; Lake Harney, 33; Lake Kissimmee, 2; Lake Mobley (Hillsborough County), 1; Mullett Lake (Orange County, 2; Ocala National Forest, 5; Okeechobee, 2; Ponce Park, 1; Port Mayaca, 5; Port Richey, 6; Ritta, 9; Sebastian, 9; Sebring, 1; Silver Springs, 2; Sunbeam (near Titusville), 1; Titusville, 15; and Wilson, 2.

***Sigmodon hispidus insulicola*, new subspecies.**

INSULAR COTTON RAT.

Type.—Collected on Captiva Island, Florida, February 25, 1939, by W. H. Osgood; male adult, skin and skull, No. 48679, Field Museum of Natural History; original number 7057.

Range.—Captiva Island, Sanibel Island, Chadwick Beach (near Englewood).

External characters.—Upper parts paler and more grayish (less blackish) than in *floridanus* from the central portion of Florida; under parts more whitish; tail averaging paler both above and below; hind feet averaging paler; size smaller. Compared with *spadicipygus* from Cape Sable it is about the same size, but colors much paler and more grayish (less brownish). Compared with *littoralis* from the east coast beaches, opposite Micco, it is smaller, more grayish on the upper parts and more whitish (less buffy) beneath. Compared with *exsputus* from the Lower Florida Keys *insulicola* is decidedly more grayish, lacking the strong buffy suffusion on the upper parts shown by *exsputus*. The underfur is of a darker shade of neutral gray.

Cranial characters.—Skull much smaller and relatively shorter than that of *littoralis* or *floridanus*; similar in size to that of *spadicipygus*.

Color.—*Type*: Hairs of upper parts tipped with buffy white over dark neutral gray underfur, producing a grayish effect; rump shows a stronger suffusion of pale buff; sides pale pinkish buff; feet grayish white; tail hair brown above, whitish beneath; under parts creamy white.

Some specimens from Sanibel Island are slightly more suffused with buff on the back and sides, but all are paler than in *floridanus*.

Measurements.—*Type* (male adult): Total length, 274; tail vertebrae, 117; hind foot, 31. Average of 6 adult males, from Sanibel Island (5), and Captiva Island (1): 278; 114; 31.7. *Skull*: Average of 4 adult males from same localities: Occipitonasal length, 35.9 (35.2–36.9); zygomatic breadth, 20.3 (20–21); cranial breadth, 15.6 (15.1–15.6); length of nasals, 14.3 (14–14.9); maxillary tooth row, 6.7 (6.7–7).

Remarks.—The range of this pale, gray race of the cotton rat is not

known in detail; it seems to be confined mainly to islands or beaches on the southwest coast of Florida. Specimens from the mainland at Englewood are somewhat intermediate in color between *insulicola* and *floridanus*, but are best referred to the former.

The writer is indebted to Dr. Wilfred H. Osgood for calling attention to this form and for permission to describe it.

Specimens examined.—Total number, 21, from localities as follows: Florida: Captiva Island, 2¹; Sanibel Island, 10¹; Chadwick Beach (near Englewood), 3; Englewood, 5; Pine Island (Lee County), 1.²

Some specimens from Sanibel Island are slightly more suffused with buff on the back and sides, but all are paler than in *floridanus*.

Measurements.—*Type* (adult female): Total length, 302; tail vertebrae, 112; hind foot, 32. *Skull*: Occipitonasal length, 38.1; zygomatic breadth, 21; cranial breadth, 15.9; length of nasals, 15; maxillary tooth row, 6.8.

Remarks.—The range of this pale, gray race of the cotton rat is not known in detail; it seems to be confined mainly to islands or beaches on the southwest coast of Florida. Specimens from the mainland at Englewood are somewhat intermediate in color between *insulicola* and *floridanus*, but are best referred to the former.

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United States Department of the Interior, Fish and Wildlife Service, Washington, D. C.

¹ Field Mus. Nat. Hist.

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PROCEEDINGS
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NINE NEW GRASSES FROM MEXICO.

BY JASON R. SWALLEN.

The grasses herein described in the genera *Bromus*, *Sporobolus*, *Muhlenbergia*, *Stipa*, *Bouteloua*, and *Andropogon* were among recent collections of Ivan M. Johnston, C. H. Muller, and Robert M. Stewart in Coahuila, and Virginius H. Chase in Nuevo Leon.

Bromus pinetorum Swallen, sp. nov.

Perennis 80-120 cm. altus; culmi erecti, infra nodos retrorse pilosi; vaginae internodiis breviores, dense villosae; ligula 1-2 mm. longa; laminae 25-32 cm. longae, 5-10 mm. latae, firmae, utrinque pilosae; paniculae 20-25 cm. longae, ramis arcuatis, scabris, basi nudis, inferioribus usque ad 15 cm. longis; spiculae 2.5-3 cm. longae, 3-7 mm. latae, 7-9-florae; glumae acuminatae, pilosae, prima angusta, 7-9 mm. longa, 1-nervis, secunda latior, 10-11 mm. longa, 3-nervis, arista 1 mm. longa; lemmata 10-11 mm. longa, obtusa, hirsuta, arista 5-8 mm. longa, scabra; palea lemma aequans, carinis minute ciliatis, inter carinas pubescens.

Perennial, 80 to 120 cm. high; culms erect, retrorsely pilose below the nodes; sheaths mostly shorter than the internodes, densely and softly villous; ligule brown, 1 to 2 mm. long; blades 25 to 32 cm. long, 5 to 10 mm. wide, firm, usually densely pilose on both surfaces; panicles 20 to 25 cm. long, apparently nodding, the branches in 2's or 3's, rather stiff but probably arcuate-spreading, densely scabrous, the lowermost as much as 15 cm. long, undivided for as much as 5 cm. from the base, the few branchlets bearing 1 or 2 spikelets; spikelets 2.5 to 3 cm. long, 3 to 7 mm. wide, 7-9-flowered; glumes acuminate, usually pilose, especially along the margins, the first narrow, 7 to 9 mm. long, 1-nerved, the second much broader, 10 to 11 mm. long, 3-nerved, with an awn about 1 mm. long; lemma 10 to 11 mm. long, rounded, obtuse, rather evenly hirsute across the back from base to apex, the awn 5 to 8 mm. long, stout, straight, scabrous; palea as long as or slightly longer than the lemma, pubescent, finely ciliate on the keels with short hairs 0.1 mm. long; rachilla appressed-hirsute.

Western Coahuila, Sierra del Pino, vicinity of La Noria, open valley with scrub oaks and scattered pines; shaded deep arroyo, Aug. 20-26,

1940, I. M. Johnston & C. H. Muller 497 (type, herb. U. S. Nat. Arbo-
retum 145089); Sierra de la Madera, vicinity of "La Cueva," Charretera
Canyon, Johnston 8926.

Sporobolus spiciformis Swallen, sp. nov.

Perennis, 40-60 cm. altus; culmi caespitosi, erecti, glabri; vaginae internodiis longiores, glabrae; ligula dense ciliata, 0.3 mm. longa; laminae 7-20 cm. longae, ca. 2 mm. latae, planae vel involutae, firmae, flexuosae; paniculae spiciformes, 9.5-13 cm. longae, 3-4 mm. latae, erectae, pallentes; spiculae 1.8-2 mm. longae, glabrae; glumae subaequales, 0.8-1.3 mm. longae, tenues, hyalinae, obtusae, minutae erosae; lemma 1.8-2 mm. longum, obtusum, minute erosum; antherae 1.3 mm. longae.

Perennial, 40 to 60 cm. high; culms in rather tough clumps, erect or nearly so, glabrous; sheaths rounded, mostly longer than the internodes, glabrous; ligule densely ciliate, 0.3 mm. long; blades 7 to 12 cm. long, or those on the innovations to 20 cm. long, or sometimes longer, about 2 mm. wide at the base, flat or becoming involute, firm, usually flexuous; panicles spikelike, 9.5 to 13 cm. long, 3 to 4 mm. wide, erect, pale; spikelets 1.8 to 2 mm. long, glabrous; glumes subequal, 0.8 to 1.3 mm. long, thin, hyaline, subacute or obtuse, entire or minutely erose; lemma 1.8 to 2 mm. long, obtuse, minutely erose; palea as long as the lemma, glabrous; anthers 1.3 mm. long.

Puerto del Norte, Cuatro Cienegas, Coahuila, 1460 m. alt.; July 18, 1939, Leroy H. Harvey 1225 (type, U. S. Nat. Herb. 1763006); alkaline flats, 4 miles west of Cuatro Cienegas, common, Johnston 7132; 4 km. southeast of Laguna del Rey, road from Guimbalet to Acatita, abundant on salt flat, Stewart 2654.

This species resembles *Sporobolus phleoides* Hack. of Argentina, which is a coarser grass with blades as much as 5 mm. wide, and spikelets 1.5-1.6 mm. long, the glumes and lemma acuminate rather than obtuse, the palea shorter than the lemma, and the anthers only 0.3 mm. long.

Muhlenbergia publigluma Swallen, sp. nov.

Perennis, 75-90 cm. alta; culmi erecti, dense caespitosi infra nodos dense pubescentes; vaginae compressae, carinatae, scaberulae, internodiis longiores; ligula 5-7 mm. longa, decurrens; laminae usque ad 35 cm. longae, 2-2.5 mm. latae, attenuatae, scabrae; paniculae 20-25 cm. longae, 1 cm. latae, densae, ramis gracilibus, appressis, ad basin floriferis; spiculae 2.5-3 mm. longae, breviter pedicellatae; glumae aequales, 2-2.5 mm. longae, obtusae, scabrae vel pubescentes; lemma 2.5-3 mm. longum in parte inferiore pilosum pilis appressis, in parte superiore scabrum, exaristatum vel arista ca. 0.5 mm. longa; antherae 1.5 mm. longae.

Perennial, 75 to 90 cm. high; culms densely tufted, erect, glabrous, densely pubescent below the nodes; sheaths compressed, keeled, scaberulous, usually longer than the internodes; ligule 5 to 7 mm. long, thin, decurrent; blades conduplicate, as much as 35 cm. long, 2 to 2.5 mm. wide unfolded, attenuate to a rather fine point, firm, scabrous, more or less flexuous toward the tip; panicles 20 to 25 cm. long, about 1 cm. wide,

dense but interrupted below, the slender branches appressed, floriferous to the base, the lower ones about 4 cm. long; spikelets 2.5 to 3 mm. long, plumbeous, short-pedicellate, the pedicels scabrous; glumes equal, 2 to 2.5 mm. long, broad, obtuse, scabrous to pubescent in lines; lemma 2.5 to 3 mm. long, densely appressed-pilose below, scabrous in lines above, awnless or usually with an awn about 0.5 mm. long; anthers 1.5 mm. long.

Municipio de Cuatro Cienegas, Sierra de la Madera, Cañon del Agua, Coahuila, common in shrub zones of lower canyon, Sept. 10, 1939, C. H. Muller 3264 (type, herb. U. S. Nat. Arboretum 145092).

This species is related to *Muhlenbergia pubescens* (H. B. K.) Hitchc., which is much stouter, with panicles as much as 40 cm. long, the branches naked at the base, and spikelets 3-4 mm. long, the glumes of which are as long as or slightly longer than the lemma.

Stipa alta Swallen, sp. nov.

Perennis 1.8 m. alta; culmi robusti, erecti, glabri; vaginae glabrae vel minute scabrae, inferiores internodiis longiores, superiores elongatae internodiis breviores; ligula 4-8 mm. longa, alba; laminae usque ad 60 cm. longae, 7 mm. latae, firmae, planae, nervosae, scabrae; paniculiae ca. 28 cm. longae, 1.5 cm. latae, densae, ramis appressis in parte inferiore nudis, usque ad 10 cm. longis; glumae acuminatae, 3-nerves, prima 10-11 mm. longa, secunda 7-8 mm. longa; fructus 4-5 mm. longus, brunneus, pilosus pilis albis; callum pungens, 0.5 mm. longum, breviter barbatum; arista 8-12 mm. longa, 1-2-geniculata, infra geniculam tortuosa.

Perennial, 1.8 m. high; culms rather stout, erect, glabrous; sheaths glabrous or minutely scabrous, the lower ones overlapping, the upper ones elongate, shorter than the long internodes; ligule prominent, 4 to 8 mm. long, white; blades as much as 60 cm. long, 7 mm. wide, the uppermost much smaller, very firm, flat but becoming rolled at least in drying, long-attenuate, strongly nerved, very scabrous especially on the lower surface and on the margins; panicle 28 cm. long, about 1.5 cm. wide, rather dense, the branches appressed, at least some of them naked at the base, the lowest ones as much as 10 cm. long; glumes acuminate, 3-nerved, hyaline toward the tip, the first 10 to 11 mm. long, the second 7 to 8 mm. long; fruit 4 to 5 mm. long, dark brown, pilose with white hairs, the callus sharp, less than 0.5 mm. long, short-barbate; awns 8 to 12 mm. long, relatively stout, once- or obscurely twice-geniculate, tightly twisted below the bend, the terminal segment straight.

Municipio de Cuatro Cienegas, Sierra de la Madera, Cañon del Agua, Coahuila, rare in dry shrub zones of lower canyon, Sept. 10, 1939, C. H. Muller 3261 (type, herb. U. S. Nat. Arboretum 145097).

This is one of the few species of *Stipa* having a long ligule. This character, and the long, broad, stiff blades, readily identify it.

Bouteloua johnstoni Swallen, sp. nov.

Perennis 25-45 cm. alta; culmi dense caespitosi, erecti, basi decumbentes, simplices vel pauciramiosi, scaberuli, sparse pilosi; vaginae interno-

diis longiores, sparse vel dense pilosae vel villosae; ligula ciliata, 0.3 mm. longa; laminae 10-15 cm. longae; firmae, involutae, pungentes, recurvatae, supra prope basin sparse vel dense villosae; spicae 6-12, 1-1.7 cm. longae, pectinatae, patentes vel reflexae, 7-11-spiculatae; spiculae 8-9 mm. longae, flore perfecto 1, floribus reductis 2; gluma prima 2 mm. longa, 1-nervia arista gracili 1.5 mm. longa; secunda 6-8 mm. longa, latior, acuta vel minute dentata 1-3-nervis, scabra et prope basin pubescens vel villosa, marginibus tenuibus, hyalinis; lemma fertile 6-7 mm. longum, dorso glabrum ad margines sparse pilosum, 3-lobatum, lobis 3 mm. longis; lemmata sterilia multo reducta, aristis planis quam glumis paulo longioribus.

Densely tufted perennial 25 to 45 cm. high; culms stiffly erect, or decumbent at the base, simple or branching at the lower nodes, scaberulous, with a few scattered soft hairs; leaves crowded toward the base; sheaths all longer than the internodes, rounded, sparsely to rather densely pilose or villous; ligule ciliate, about 0.3 mm. long; blades mostly 10 to 15 cm. long, or the uppermost much shorter, firm, involute, pungent, recurved-spreading, narrower at the base than the mouth of the sheath, sparsely to rather densely villous, especially on the upper surface toward the base; inflorescence long-exserted, much exceeding the blades, 5 to 12 cm. long, composed of 6 to 12 somewhat distant, readily deciduous spikes, the axis prolonged beyond the upper spike in a naked bristle; spikes 1 to 1.7 cm. long, pectinate, spreading or finally reflexed, deeply tinged with purple, bearing 7 to 11 spikelets, the uppermost often much reduced; spikelets 8 to 9 mm. long, divergent from the rachis at a 45° angle, containing 1 fertile and a rudiment composed of two reduced sterile florets; glumes very unequal, the first about 2 mm. long, thin, 1-nerved, bearing a slender awn about 1.5 mm. long, the second 6 to 8 mm. long, much broader than the first and nearly enclosing the florets, acute or minutely dentate, 1- or obscurely 3-nerved, scabrous and pubescent or pilose toward the base, glabrous above, the margins thin, usually hyaline; lemma of fertile floret 6 to 7 mm. long, parted at the summit into 3 awn-like lobes, the central about 3 mm. long, the lateral ones a little shorter, the body of the lemma glabrous on the back, sparsely pilose toward the margins; rudiment composed of two sterile florets reduced to awns flattened at the base, the awns somewhat exceeding the glumes.

Common on gypsum-beds in western Coahuila. South end of Cañada Oscuro near Tanque La Luz, Sept. 27, 1942, I. M. Johnston 8491 (type, herb. U. S. Nat. Arboretum 154624); Rancho Parritas, base of mountains along eastern margin of the Valle de Acatita, Stewart 2763.

Bouteloua johnstoni is a very distinct species related to *B. chondrosioides* (H. B. K.) Benth. and *B. eludens* Griffiths but is readily distinguished by the characteristic firm, involute, recurved-spreading blades. The spikelets of *B. chondrosioides* and *B. eludens* also contain only 1 fertile floret, but the first glumes are longer and narrower, and the second glumes are conspicuously hairy.

Bouteloua chasei Swallen, sp. nov.

Perennis, 20–30 cm. alta; culmi erecti rhizomatosi; vaginae glabrae vel in marginibus in parte superiore ciliatae, in ore villosae; ligula ciliata 0.2–0.3 mm. longa; laminae involutae, firmae, curvatae marginibus basi villosis; spicae 2–4, pectinatae, 1.5–2.5 cm. longae, distantes, anguste adscendentes vel patentes; spiculae flore perfecto 1; floribus reductis 2; gluma prima 2 mm. longa, acuminata, 1-nervis, glabra; gluma secunda 2–4 mm. longa, acuminata, in parte inferiore dense villosa; lemma fertile 3 mm. longum, villosum, 3-lobatum, arista centrali 1.2 mm. longa, aristis lateralibus 1.5 mm. longis; lemma sterile primum 1 mm. longum lobatum, basi dense barbatum, aristis 2 mm. longis scabris; lemma sterile secundum truncatum, 1.5 mm. longum, non aristatum.

Perennial, 20 to 30 cm. high; culms erect from a knotty rhizomatous base, with a number of rather hard cataphylls at the base; sheaths rounded, glabrous, or the margins ciliate toward the summit, villous in the throat; ligule ciliate, 0.2–0.3 mm. long; blades involute, firm, curved, villous on the margins toward the base; spikes 2 to 4, pectinate, 1.5 to 2.5 cm. long, narrowly ascending to somewhat spreading, scattered on an axis 3.5 to 8 cm. long, the lower ones 2.5 to 4 cm. distant, more or less curved, short-pedicellate, the pedicel densely pubescent; spikelets composed of 1 fertile and 2 rudimentary florets; first glume 2 mm. long, acuminate, 1-nerved, thin, glabrous; second glume 2 to 4 mm. long bluntly acuminate, densely villous below, scabrous above; fertile lemma 3 mm. long, villous all over the back, 3-lobed, the central lobe bifid, awned from between the teeth, the awn 1.2 mm. long, the lateral lobes including the awns about 1.5 mm. long; first rudimentary floret 1.5 mm. long, densely bearded at the base with hairs 1 mm. long, deeply lobed, the awns rather stout, 2 mm. long, scabrous; second rudimentary floret truncate, awnless, 1.5 mm. long.

Mesa, Galeana, Nuevo Leon, 5,400 ft. alt., July 30, 1939, Virginius H. Chase 7673½ (type, U. S. Nat. Herb. 1763078).

This species is related to *Bouteloua karwinskii* (Fourn.) Griffiths which has more slender culms, flat curly blades, and spikes not more than 1.8 cm. long; the second glumes are glabrous, not more than 2 mm. long, while those of *B. Chasei* are villous and mostly 4 mm. long except the ones toward the end of the spikes, which are sometimes only 2 mm. long.

Bouteloua eriopoda var. *eriostachya* Swallen, var. nov.

E Bouteloua eriopoda (Torr.) Torr. gluma secunda villosa differt.

This variety closely resembles the species, differing primarily in having the second glumes rather densely villous. The structure of the spikelets is identical. The specimens at hand do not show any indication that the plants are stoloniferous, but this character is not always evident in the specimens. The culms are a little more conspicuously lanate than in the species.

Frequent on rocky flats, vicinity of Aguaje del Pajarito, canyon at west end of Sierra de la Fragua, 2–3 km. north of Puerto Colorado,

western Coahuila, Sept. 1-3, 1941, I. M. Johnston 8718 (type, herb. U. S. Nat. Arboretum 154692); San Antonio de los Alamos, eastern base of the volcanic Sierra de San Antonio, Johnston 8257.

***Andropogon spadiceus* Swallen, sp. nov.**

Perennis, 60-95 cm. alti; culmi graciles, erecti, glabri; vaginae compressae, carinatae, glabrae vel minute scabrae; ligula 1 mm. longa, truncata, erosa; laminae 10-25 cm. longae, 2-2.5 mm. latae, planae, scabrae; racemi bini, 3.5-5 cm. longi; rachis recta, dense ciliata pilis usque ad 6 mm. longis; spicula sessilis 7-8 mm. longa, spadicea, callo barbato pilis 1 mm. longis; gluma prima acuminata, glabra, apice hyalino, inter carinas 3-5-nervis; lemma fertile hyalinum, bifidum, arista 15-17 mm. longa, 1-geniculata, infra geniculam contorta, segmento terminali 10-12 mm. longo; spicula pedicellata reducta, ca. 4 mm. longa, exaristata.

Perennial, 60 to 95 cm. high; culms slender, erect, glabrous; sheaths compressed, keeled, glabrous or minutely scabrous, the lower ones longer, the upper ones much shorter than the internodes; ligule 1 mm. long, truncate, erose-ciliate; blades 10 to 25 cm. long, 2 to 2.5 mm. wide, flat, scabrous, sometimes with a few long hairs on the margins toward the base; racemes paired at the ends of the simple slender solitary branches from the middle and upper nodes, 3.5 to 5 cm. long, the straight rachis and sterile pedicels obscured by the dense white hairs, these short at the base, becoming longer toward the summit, as much as 5 to 6 mm. long at the tip of the rachis joints and sterile pedicels; sessile spikelets 7 to 8 mm. long, golden or chestnut brown, the callus bearded with white hairs about 1 mm. long; first glume acuminate, glabrous on the back, scabrous on the keels toward the hyaline tip, 3- to 5-nerved between the keels, the nerves green; fertile lemma hyaline, awned from the long teeth of a bifid apex, the awn 15 to 17 mm. long, once-geniculate, tightly twisted below the bend, the terminal segment straight, 10 to 12 mm. long; pedicellate spikelet greatly reduced, about 4 mm. long, awnless.

Northern Coahuila, Cañon de Madera, western side of Sierra de los Guajes, about 4 km. east of Rancho Buena Vista, Sept. 7, 1941, Robert M. Stewart 1504 (type, herb. U. S. Nat. Arboretum 154691); western Coahuila, Sierra de la Madera, vicinity of "La Cueva," 5,300-6,500 ft. alt., I. M. Johnston 9074.

This species can be recognized by brown spikelets which are in sharp contrast to the dense long white hairs of the rachis and sterile pedicels.

***Andropogon maderensis* Swallen, sp. nov.**

Perennis ca. 80 cm. altus; culmi graciles, dense caespitosi, erecti, glabri; vaginae compressae, carinatae, scabrae, eae culmorum internodiis longiores; ligula 1 mm. longa, truncata, minute ciliata; laminae 15 cm. longae, 1.5-2 mm. latae scabrae; racemi solitarii, 3-4 cm. longi, spiculis fertilibus 4-5 in ramis brevibus, gracilibus appressis; spicula sessilis 8 mm. longa, callo glabro; gluma prima acuminata glabra, apice hyalina; arista 1-geniculata, infra geniculam contorta, segmento terminali 5-7 mm.

longo; pedicellus sterilis appressis, spiculam subaequans; spicula sterilis valde reducta, acuminata, ca. 3 mm. longa.

Perennial, about 80 cm. high; culms densely tufted, slender, erect, glabrous; sheaths compressed, keeled, scabrous, all but the lower ones shorter than the internodes; ligule 1 mm. long, truncate, minutely ciliate; blades flat, or conduplicate toward the base, mostly about 15 cm. long, 1.5 to 2 mm. wide, scabrous, especially on the margins; racemes solitary at the ends of the short, usually solitary, slender branches from the middle and upper nodes, 3 to 4 cm. long, the rachis slender but straight, composed of 4 or 5 segments, evenly ciliate with long hairs from the base to the apex; sessile spikelet 8 mm. long, the callus not bearded; first glume 8 mm. long, acuminate, glabrous on the back, the tip hyaline; awn once-geniculate, tightly twisted below the bend, the terminal segment loosely twisted, 5 to 7 mm. long; sterile pedicel appressed, nearly as long as the sessile spikelet, the spikelet greatly reduced, acuminate, about 3 mm. long.

Municipio de Cuatro Cienegas, Sierra de la Madera, Cañon del Agua, abundant in shrub zone of lower canyon, Sept. 10, 1939, C. H. Muller 3262 (type, herb. U. S. Nat. Arboretum 145090).

This species is related to *Andropogon scoparius* Michx., which differs in having longer flexuous racemes, smaller sessile spikelets with the first glume papillose-roughened, and a longer terminal segment of the awn.

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NEW CONES FROM THE HAWAIIAN ISLANDS.

BY PAUL BARTSCH AND HARALD A. REHDER.

Among the Hawaiian mollusks in the collection of the United States National Museum are a number of cones that require naming. Five of these are described in this paper. Figures of them have been made and will appear in the Monograph of the Hawaiian Gastropods which is in preparation.

Conus eugrammatus, new species.

Shell small, cone-shaped, with a moderately elevated spire. The right outline of the basal portion of the shell, when viewed from the opposite side of the aperture, is slightly concave. Fresh, unworn specimens are covered with a thin, grayish white periostracum which forms slender lamellae on the fine riblets of the spire. Denuded specimens have pale buff ground color and on the spire the whorls are marked by distantly spaced, rather regular, broad, brown spots. Anterior to the keel the shell is marked by interrupted spiral bands of brown. Those on the seven flat spiral zones between the incised spiral lines anterior to the keel are rather distantly and irregularly spaced. On the next five spiral zones the interrupted bands are broader and become fused axially, while on the three succeeding zones they are again scattered and irregularly developed. On the rest of the base the brown spots are broader and form axial areas which occupy more space than the lighter intermediate spaces. Inside of the outer lip yellowish white. The early whorls form a slender apex and appear to be smooth. The succeeding turns increase more rapidly and are marked by slender, protractively curved axial riblets which fuse to form strong nodules at the shoulder. The summit of the whorls is also marked by three slender spiral threads. On the later turns the nodulation at the shoulder becomes less conspicuous and practically disappears on the last part of the last whorl. Anterior to the shoulder the whorls are marked by deeply incised spiral grooves which are widest anteriorly. The spaces between these grooves are flat. The entire surface anterior to the shoulder is also marked by fine

incremental lines. Immediately below the shoulder are several more closely approximated spiral grooves which are narrower than those anterior to this place. Aperture narrow, with the sinus at the shoulder shallow. Outer lip thin, slightly protracted. The inner lip is slightly sigmoid.

The type, U. S. N. M. No. 173213, was dredged by the U. S. Bureau of Fisheries Steamer *Albatross* at Station 3889 off the north coast of Molokai Island near Mokapu Islet. It was 8.5 whorls remaining and measures: Height, 30 mm.; greater diameter, 15.9 mm.

U. S. N. M. No. 335304 contains a specimen dredged by the *Albatross* at Station 3856 in Pailolo Channel in 127 fathoms on fine sand and yellow mud bottom; bottom temperature, 66.5° F.

U. S. N. M. No. 190415 contains 2 specimens dredged by the *Albatross* at Station 3810 off the south coast of Oahu Island in 211-53 fathoms on fine coral sand bottom; bottom temperature, 47.7° F.

This species most nearly resembles *C. maculospira* Pilsbry and Johnson 1922 (= *C. planiliratus* Sowerby, 1870, not Sowerby, 1849, which Sowerby stated came from the China Sea). It differs from this, however, in the color pattern.

Conus hammatus, new species.

Shell small with moderately elevated spire. The left outline is slightly concave near the base. General color scheme buff with a faint, almost obsolete, lighter zone immediately anterior to the shoulder, and another even paler on the middle of the last whorl; while the summit of the whorls is marked by more or less regularly spaced axial spots of reddish brown. Interior of aperture bluish white. The entire surface is covered by a moderately strong periostracum which forms very regularly developed and distributed wavy thread-like incremental lines. The whorls on the top of the spire are separated by a well-impressed suture and are marked by three low, rounded, spiral threads and protractively slanting, almost riblike, closely spaced incremental lines. The shoulder shows the merest tendency to knobbing. Anterior to the shoulder the surface bears 32 spiral threads which vary in strength, the spaces between the stronger ones bearing 1-3 finer elements. These threads are feebly nodulose, the nodules varying in strength, corresponding to that of the threads. Aperture narrow, widening basally, concavely incised at the summit; outer lip thin and sharp at the edge; inner lip concave with a thin callus.

The type, U. S. N. M. No. 173225, was dredged by the U. S. Bureau of Fisheries steamer *Albatross* at Station 4128 near Kauai Island in 253-179 fathoms on coarse broken coral, sand, and foraminifera bottom; bottom temperature, 47.8° F. It measures: Height, 22.5 mm.; greater diameter, 12 mm.

U. S. N. M. No. 190416 contains 2 topotypes from the same source.

This species resembles *C. lividus* but is smaller and has the knobbing at the shoulder scarcely indicated. It also lacks the purple lip of the base,

Conus spiceri, new species.

Shell large, with low, slightly concave spire. The left outline between the shoulder and base is also slightly concave in the middle. The entire surface of the shell is covered by a thick, raw umber colored periostracum, which when removed shows a pale yellow shell. The interior of the aperture is bluish white. The whorls are separated by a slender impressed suture and marked by protractively curved incremental lines and a single slender spiral thread. The shoulder is sharply angulated. Between this and the base the last whorl is marked by fine incremental lines and very slender, closely spaced, spiral threads which become heavier and somewhat more distantly spaced anteriorly. Aperture moderately broad, widening slowly anteriorly. Peristome concavely excised at the summit.

The type, U. S. N. M. No. 537792, was collected by Mr. V. D. P. Spicer on Sand Island, Midway Island atoll, Hawaiian Islands. It measures: Height, 67.5 mm.; greater diameter, 41 mm.

This species resembles *C. quercinus* 'Solander' Humphreys 1786, but lacks the delicate chestnut colored spiral lines. It also has a flatter spire and only one spiral thread on the summit of the turns.

We take pleasure in naming it for its discoverer who has added many fine things to the collection of the U. S. National Museum.

Conus smirna, new species.

Shell rather large, slender for the genus, very regularly biconic. The spire is well elevated with straight sloping sides almost equal to one-quarter of the entire height of the shell. The surface is covered by a thin, yellow-ochre-colored, smooth periostracum with a broad, slightly lighter zone about halfway between the angled shoulder and the base, and of about equal width at the base. Interior of the aperture bluish white. The early whorls bear strong, equal and equally spaced, nodules at the shoulder which are separated by spaces a little wider than the nodules. These nodules become gradually and successively weakened on the succeeding whorl and disappear completely on the last turn. In addition to the nodules, the summit of the whorls is marked by fine incremental lines and equally fine spiral lirations. Anterior to the shoulder the last whorl is marked by incremental lines and spiral lirations. These consist of very fine hair lines on the posterior part which gradually increase in strength anteriorly, forming rather strong spiral threads basally. Aperture moderately broad, of almost the same width throughout. Outer lip thin, slightly excised on the shoulder.

The type, U. S. N. M. No. 173226, was dredged by the U. S. Bureau of Fisheries steamer *Albatross* at Station 4132, near Kauai in 257-312 fathoms on fine gray sand and mud bottom; bottom temperature, 46.8° F. It measures: Height, 60.9 mm.; greater diameter, 22.8 mm.

We know of no closely related species.

Conus halitropus, new species.

Shell of medium size and elongate-ovate outline with moderately elevated spire. The entire surface is marked by irregularly shaped and distributed blotches, zones, and dots of pale raw sienna; the lighter areas separating these are flesh-colored. The last whorl is decidedly descending. The suture separating the whorls is a mere impressed line. The summit of the whorls is gently sloping and is marked by slender thread-like incremental lines and equally strong spiral lirations, the combination producing a fine screen-like pattern. Anterior to the shoulder the shell is marked by almost obsolete incremental lines and equally ill-defined spiral lirations on the posterior half; while the anterior half is marked by weak, rounded spiral threads. Aperture rather broad, widening anteriorly, with a moderately deep sinus at its summit. Outer lip thin; inner lip glazed with a thin callus.

The type, U. S. N. M. No. 338579, was collected by Mr. D. Thaanum at a dredger dump at Honolulu. It measures: Height, 32.5 mm.; greater diameter, 13.8 mm.

U. S. N. M. No. 537793 contains a topotype from the same source.

This species most nearly resembles *C. obscurus* Reeve 1843, which came from Masbate, Philippine Islands, but can easily be distinguished from this by being of lighter color and in lacking the spiral color lines in the blotches.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SKUNK OF THE GENUS *CONEPATUS* FROM
MEXICO.

BY E. A. GOLDMAN

In identifying specimens of tropical skunks from Mexico the writer noticed a hitherto unrecognized geographic race inhabiting the peninsula of Yucatan. It is based mainly on specimens collected by E. W. Nelson and the writer more than 40 years ago.

Conepatus tropicalis yucatanicus, subsp. nov.

Type.—From La Vega, on mainland coast opposite Isla Cancun, northeastern Quintana Roo, Mexico. No. 108502, ♂ young adult, skin and skull, U. S. National Museum (Biological Surveys collection); collected by E. W. Nelson and E. A. Goldman, March 19, 1901. Original number, 14625.

Distribution.—Yucatan, Quintana Roo, and Guatemala; limits of range undetermined.

General characters.—A subspecies of medium size, with long tail and two white dorsal stripes extending far backward. Similar in general to *Conepatus tropicalis tropicalis*, of Vera Cruz, but tail much longer; color about the same, but white of tail more extensive, owing to greater length; cranial details different. Also similar to *Conepatus tropicalis trichurus* of Panama, but smaller; white dorsal stripes extending farther posteriorly.

Color.—*Type*.—Head white across crown from which two white stripes, separated by a narrower median black stripe, extend posteriorly along back, gradually narrowing to points near hips, a few hairs faintly indicating continuation to base of tail; face, sides of body, under parts, and limbs black; tail white to near base, the white narrowing to a point above, leaving sides and basal two inches below black. In a topotype the white dorsal stripes are more completely interrupted on rump.

Skull.—Similar in size to that of *tropicalis*, but frontal region broader between orbits and at postorbital constriction; anterior nares less oblique, less extended antero-posteriorly as viewed from above; mastoid bullae less inflated; dentition slightly heavier. Compared with that of *trichurus* the skull is somewhat smaller, with lighter dentition.

Measurements.—Type and a young adult male topotype, respectively: Total length, 565, 555 mm.; tail vertebrae, 194, 175; hind foot, 75, 76. *Skull:* Type and a young adult male topotype, respectively: Median length (occiput to end of premaxilla), 77.2, 75; condylobasal length, 75.5, 75.4; zygomatic breadth, 46.5, 48.3; mastoid breadth, 41.6, 41.2; interorbital breadth, 22.5, 23.3; postorbital breadth, 19.3 19.8; maxillary tooth row (front of canine to back of carnassial), 24.1, 23.3; upper carnassial (crown length, outer side), 8.1, 8.1. An adult female from Merida, Yucatan: Median length (occiput to end of premaxilla), 74.3; condylobasal length, 70.8; zygomatic breadth, 49; interorbital breadth, 22.1; postorbital breadth, 18.4; maxillary tooth row (front of canine to back of carnassial), 23.3; upper carnassial (crown length, outer side), 8.1.

Remarks.—*Conepatus tropicalis yucatanicus* appears to be a peninsular race, closely allied to *C. t. tropicalis* of Vera Cruz. It differs most obviously in the greater length of the tail. In length of tail it more nearly approaches *C. t. trichurus* of Panama, but the latter differs in larger size and heavier dentition as pointed out.

Specimens examined.—Total number, 4, as follows:
Guatemala: Without definite locality, 1 (skull only).
Quintana Roo: La Vega (type locality), 2.
Yucatan: Merida, 1 (skull only).

PROCEEDINGS
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NOTES ON FISHES IN THE ZOOLOGICAL MUSEUM
OF STANFORD UNIVERSITY.

XI. TWO NEW GENERA AND SPECIES.
WITH KEY TO THE GENERA OF GOBIES
WITH VOMERINE TEETH.

BY ALBERT W. C. T. HERRE.

Of the many remarkable gobies of the Indo-Pacific, those with vomerine teeth are among the most peculiar. For many years the only one known was a small goby from Samoa. Since then I have discovered ten more species, seven in the Philippines, one in the Pelew Islands, and two at Singapore. All share the extraordinary character of having two incisor-like teeth on the vomer; they are always large, and may be relatively enormous in size. They are side by side, across the vomer, and some species have them fused to form a single gigantic chisel.

These teeth are not always easy to make out, and have been overlooked no doubt by students of fishes. It is highly probable that a number of additional species of gobies with vomerine teeth will be discovered when further collecting is done, and when all the species of Indo-Pacific gobies already known are critically examined. In spite of the large number of new species of gobies added to the Indo-Pacific fauna during the past twenty years, particularly in the Philippines, I feel that we have only made a beginning at the study of this great family. Intensive collecting almost anywhere in the East Indian region will reveal many new and astonishing gobies.

INTONSAGOBIOUS Herre, new genus.

From related forms this genus is separated by the presence of two broad incisors on the vomer. Dorsal VI-I-9 or 10; anal I-7 or 8; scales 24-30 in longitudinal, 9 in transverse series; predorsal region scaled to eyes, head otherwise naked; isthmus and pectoral base scaled; scales

ctenoid except on belly and before a vertical from the first dorsal origin. Head broad, form thickset; mouth small, terminal, slightly oblique; outer row of teeth enlarged, followed by a band of 4 rows of minute teeth in the upper jaw and 5 rows in the lower jaw. Tip of tongue free, rounded. The entire head is marked by many well-developed transverse and longitudinal fringed ridges, bearing conspicuous rows of sensory papillae; vertical rows of sensory papillae on anterior part of body and at least on the central row of lateral scales to the caudal base. Anterior nostril a long tubule. Dorsals well separated, the vertical fins equal to or greater than the depth; no modified silky rays on pectoral, which equals the rounded caudal; both pectoral and caudal more or less equal to the head; ventrals reaching the anus, with well-developed frenum, their rays fringed much as in *Eviota*; gill opening little wider than the pectoral base, not extended forward, isthmus broad. Genital papilla prominent.

Near to *Callogobius* and *McGregorella*, and distantly related to *Mars*.

Type *Intonsagobius kuderi* Herre, new species, from a coral reef a few miles west of the city of Jolo, Sulu Province, Philippine Islands.

Intonsa, unshorn or unshaven.

KEY TO THE GENERA OF GOBIES WITH VOMERINE TEETH.

- A. Scales ctenoid, about 26.
- B. Scales covering head and body; no prominent ridges or rows of sensory papillae on head.....*MACRODONTOGOBIOUS*
One species from the Pelew Islands.
- BB. Head naked, with numerous transverse and longitudinal ridges with sensory papillae; median lateral scales with vertical rows of sensory papillae.....*INTONSAGOBIOUS*
One species from Jolo, Philippine Islands.
- AA. Scales 40 or more, ctenoid or cycloid.
 - C. Scales more or less ctenoid, at least on posterior half.
 - D. Scales 40-50, ctenoid, or more or less cycloid on anterior half; naked before first dorsal; mouth nearly vertical, chin prominent; cheeks without conspicuous lines of sensory papillae.....
MANGARINUS
One species from Mindoro, P. I.
 - DD. Scales 60-65, all ctenoid or at least those on posterior half; mouth moderately oblique, the jaws equal or nearly so; sides and top of head with many conspicuous lines of sensory papillae.....
MARS
Three species known, one from Samoa and two from the Philippines.
 - CC. Scales cycloid, over 50.
 - E. Maxillary extended far back on preopercle, the lower jaw projecting; scales about 60; head, predorsal region, a strip back to second dorsal, and area below a diagonal from anus to pectoral axil all naked.....*MYERSINA*
One species, from Culion, P. I.

EE. Maxillary not prolonged backward, mouth ordinary, moderately oblique, the jaws equal; scales 70-85; naked back to dorsal origin and ventral base; upper lip lined with a dense papillate fringe.....*SMILOGOBIUS*
Four species, two from the Philippines and two from Singapore.

Intonsagobius kuder Herre, new species.

Dorsal VI-I-9; anal I-7; scales in a longitudinal series 25-27, but usually 26; transverse series 9; predorsal scales 6.

The depth is 4 to 4.3, the head about 3 (2.9-3.18), the caudal 2.8 times in the length. The body is low, plump and thickset, the upper profile moderately arched, the lower outline nearly horizontal, the wedge-shaped head a little broader than deep, its width 1.3 to 1.4 times in its own length. The latero-dorsal eyes are very high up, projecting above the profile, 3.6 to 3.9 times in the head, close together, the width of the interorbital 2.3 to 2.6 in the eye; the broad snout is a little longer than the eye, 3.3 to 3.4 in the head. The mouth is small, with thick lips, the posterior angle of the maxillary concealed but scarcely reaching a vertical from the front margin of the eye; the teeth are as given for the genus. There are 3 or 4 vertical and 2 transverse ridges on the cheek, a vertical and 2 transverse or diagonal opercular ridges, and other short ridges on the sides and top of the snout and behind the eyes; on the sides of the nape and under side of the head, and on the median row of scales back to the caudal base are rows of sensory papillae. A row of pores about the upper half of the eye, including two conspicuous ones in the interorbital space, and additional pores in the supra-opercular groove and on the hind margin of the preopercle. The scales as given for the genus.

The second dorsal spine is elongate, its threadlike tip reaching to the middle of the second dorsal fin when depressed, or to the base of the first ray of the second dorsal in females, 3.45 to 3.7 times in the length. The second dorsal is highest in the posterior half, reaching the caudal base when depressed, equal to or slightly more than the depth, 4.4 to 4.5 in the length; the anal rays are longest posteriorly, reaching or exceeding the caudal base, 3.1 to 3.6 in the length. The pectoral is 2.9 to 3, the ventrals 3.9 to 4.3 times in the length. The least depth of the caudal peduncle is 2.2 to 2.4 times in the head and 1.66 to 1.9 times in its own length. The genital papilla is very slender, long and pointed in males, broader, thicker, with a slightly notched tip in females.

The color in alcohol is uniform brown, with 3 or 4 obscure broad transverse bands of darker brown, the under side of the head paler. The dorsals, pectorals, and caudal are cross-barred by brown or blackish brown and whitish; the anal is dusky or with faint whitish crossbars; the ventrals are dusky, or may be marginally pale.

Described from the type, a male 35 mm. long, and 3 paratypes, another male 31 mm. long and two females, 34 and 28 mm. in length. A juvenile specimen is 18 mm. long. Collected from coral in a lagoon amid a group of small isles about 8 miles west of Jolo, Sulu Province, Philippine Islands.

Named in honor of Division Superintendent of Schools Kuder, whose generous cooperation made possible my visit to the islands about Jolo harbor.

MANGARINUS Herre, new genus.

Dorsal VI-I-11; anal I-10; scales ctenoid or only those on hind half ctenoid, 40 to 50 in longitudinal series; scales on posterior third much larger than anteriorly; head and body more or less naked back to a vertical from the first dorsal to the ventral; mouth very oblique, nearly vertical, chin prominent; teeth in 6 rows, those of the outer row enlarged, those of the innermost row nearly as large; a pair of anterior recurved canines above, and a pair of larger hooked canines below; two large flat incisor-like teeth on the vomer; the tongue is free, its tip rounded. Dorsals close together, pectoral and ventrals elongate, the caudal pointed, longer than head. The gill openings are little wider than the pectoral base, not extended forward, the isthmus rather broad. Branchiostegals 5.

Type of the genus *Mangarinus waterousi* Herre, new species.

Mangarinus, from Mangarin, Mindoro, P. I.

Mangarinus waterousi Herre, new species.

Dorsal VI-I-11; anal I-10; scales 44 to 48 in a longitudinal, 20-22 in a transverse series, ctenoid, or only those on the posterior half ctenoid, the scales on the hind third larger than the rest.

The body is low, elongate, the dorsal and ventral profiles nearly horizontal and parallel, the head slightly depressed, its breadth equal to its depth. The greatest depth is at the dorsal origin, about 7, the head 4 times in the length. The central rays of the broad caudal become elongated, the fin then longer than the head, 3 times in the length. The eyes are small, equal to the snout, 6 to 6.6 times in the head; the interorbital is 1.5 times in the eye. The anterior nostril is in a flaccid tubule protruding over the edge of the snout; the posterior nostril is a large open pit just before the eye; above and behind it is a large open pore; a conspicuous pore in the centre of the interorbital space and another at its posterior margin; a pore behind the middle of the eye and a row of pores along the groove above the preopercle and opercle. The teeth are as already given for the genus. A row of minute sensory papillae from the region of the anterior nostril downward and then backward across the middle of the cheek, and another one from the angle of the mouth; two short rows of similar papillae on the opercle.

The low dorsals are close together; the tips of the first dorsal spines are more or less filiform, the longest equal to the depth of the caudal peduncle, 2.66 times in the head; the second dorsal and anal are highest posteriorly, extending to or upon the caudal base when depressed, the longest rays 1.6 times in the head or a trifle more than the depth. The pectoral is 4.25, the ventral 4.5 to 4.9 times in the length, both fins with pointed tips. The anal papilla is thin, rather flat, pointed, and inconspicuous.

The color in alcohol is uniform brown, the sides of the head mottled with darker brown; paler on the belly and under side of the head; the vertical fins are black; the caudal is clear, with numerous crossbars of brown spots; the pectorals and ventrals are clear, or may be sprinkled basally with dusky dots.

Described from the type, 33.5 mm. long, and 3 paratypes 32 to 33 mm. in length, collected in a mangrove swamp at Hacienda Waterous, Mangarin, Mindoro.

Named for my esteemed friend, army officer, and eminent physician, Dr. W. H. Waterous, who placed the resources of Hacienda Waterous at Mangarin, at my disposal.

PROCEEDINGS
OF THE
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SOME RECORDS AND DESCRIPTIONS OF
AMERICAN CHILOPODS

BY RALPH V. CHAMBERLIN

The centipeds recorded in the present paper, unless otherwise noted, were collected by Stanley and Dorothea Mulaik, mostly during the summer of 1941 in the course of a trip from Salt Lake City to Edinburg, Texas, and return by way of Colorado, Wyoming, Montana and Idaho. All material, including types of the new species, is at present retained in the author's collection at the University of Utah.

SCOLOPENDRIDA

CRYPTOPIDAE

Otocryptops gracilis (Wood)

Locality.—Texas: Harris County, Houston, September-December, 1941. Three specimens taken by Russell Scott.

Theatops posticus (Say)

Locality.—Texas: Harris County, Houston, September-December, 1941. Several specimens, mostly young, taken by Russell Scott.

Kethops atypus, new species.

Differing from the two species previously described under *Kethops*, in having the cephalic plate overlapping the first tergite and in lacking a transverse sulcus on the latter.

Cephalic plate with no transverse sulcus; with short, paired, longitudinal sulci over the posterior portion.

Paired sulci beginning on the third tergite and continuing on those to and including the 22nd. Last tergite with caudal margin forming an angle, the lateral margins straight and slightly diverging caudad to the base of the triangular caudal portion.

Last ventral plate trapeziform, the sides converging caudad to the straight caudal margin.

Legs, excepting posterior pair, without spines or teeth.

Coxopleurae of last legs truncate posteriorly; bearing below along sternite about 20 small pores on each side.

Anal legs with femur and tibia bearing beneath numerous long, stiff, spine-like setae but with no teeth; metatarsus armed beneath with a series of 6 teeth, and first tarsal joint with a series of 3 teeth.

Length, about 15 mm.

Locality.—Utah: Salt Lake City, two specimens taken April, 1942.

Cryptops centralis, new species.

Resembling *C. eques*, occurring in the same region, in the relations of head and first tergite and in having a simple, evenly semi-circular sulcus on the latter.

Differing from *eques* in the form of the last dorsal plate which is angular instead of semicircular behind.

In the anal legs of the male the femur and tibia with numerous short, acute spines beneath, these leaving no naked area. Metatarsus below with a series of typically 6 small, even teeth, and the first tarsal joint with 5 as against 3 on metatarsus and 2-3 on first tarsal joint in *eques*.

Length, 11 mm.

Locality.—Texas: Kerr County, Center Point, July 29, 1941. One specimen.

The type specimens of *C. eques* are mostly considerably smaller than the holotype of *C. centralis*, although some of the former are as much as 10 mm. long.

SCOLOPENDRIDAE.

Scolopendra viridis Say.

Locality.—New Mexico: 6 miles south of Mountainair, May 31, 1941, one specimen; Dona Ana County, San Augustine Pass, June 1, 1941, one young specimen.

Texas: Jim Wells County, 12 miles north of Alice, June 6, 1941, one specimen.

Scolopendra polymorpha Wood.

Localities.—Texas: Hudapeth County, Hancock, June, 1941, one specimen.

New Mexico: Tijeras, May 30, 1941, one specimen; 33 miles north of Gallup, May 29, 1941, several specimens; Manzano, May 31, 1941, one specimen; 6 miles south of Mountainair, May 31, 1941, several specimens.

GEOPHILIDA.

SCHENDYLIDAE.

Schendyla nemorensis (C. L. Koch).

Locality.—Utah: Salt Lake City, April, 1942, many specimens taken on cultivated land in the city proper. Apparently introduced.

Holitys neomexicanus Cook.

Locality.—New Mexico: 1 mile north of Thoreau, May 29, 1941, two specimens.

Originally described from Dripping Spring, Organ Mountains, in the same state and not subsequently heretofore recorded.

BALLOPHILIDAE.

Ityphilus nemoides, new species.

The color of the holotype at present is pale yellow, any purplish pigment that may have been present in life having disappeared.

Body considerably constricted over segments following head and first segment.

Head small as usual. Antennae moderately clavate beyond the middle, not as strongly clavate distally as, e. g., in *savannus*.

Spiracles all small and circular.

Ventral pores in a well-defined circular area.

Last ventral plate broad, trapeziform, strongly narrowed caudad.

Anal legs in male holotype strongly thickened proximally, narrowing subconically distad as usual.

Pairs of legs in male holotype, 73.

Length, 30 mm.

Locality.—Texas: Jim Wells County, 12 miles north of Alice, June 6, 1941, one male.

Most easily separated from the Mexican *I. savannus*, in the notably larger number of pairs of legs.

GEOPHILIDAE.

Geophilus phanus, new species.

Of the usual yellow color, with head and prehensors of a slightly chestnut cast.

Cephalic plate longer than broad, widest posteriorly; caudal margin wide and straight and the anterior margin forming a very obtuse angle; sides convex; frontal plate not discrete.

Basal plate overlapped anteriorly by the cephalic, as wide posteriorly as the following tergite. Claws of prehensors when closed about even with anterior margin of head; all joints of prehensors wholly smooth within. Prosternum unarmed anteriorly; chitinous lines distinct except at anterior ends.

All spiracles circular, the first largest, the second intermediate.

Last ventral plate broad, trapeziform. Pores small and numerous, arranged in a series lying along each margin of sternite and continuing back part way along margin of tergite, with 3 more widely separated pores on the side.

Anal pores distinct.

Pairs of legs, 63.

Length, 29 mm.

Locality.—Montana: Brown, elevation 5060 feet, September 19, 1941, one female.

Probably most closely related to *G. huronius* Meinert. It differs in the shorter prehensors which do not exceed the anterior margin of head and have the first joint very short within and wholly without trace of a tooth; also in the more numerous coxal pores which are free from the last sternite.

Geophilus glyptus Chamberlin.

Locality.—Utah: Mill Creek Canyon, Mar. 15, 1943. Several Specimens.

Arenophilus bipuncticeps (Wood).

Locality.—Wyoming: Natrona Co., Casper, August 10, 1941, one specimen.

LINOTAENIIDAE.

Linotaenia chionophila (Wood).

Localities.—Wyoming: Natrona Co., Casper, Aug. 10, 1941, one specimen; Fremont County, Brooks Lake Falls, August 12, 1941, two.

Colorado: Larimer County, Home, Aug. 7, 1941, two specimens.

Montana: 19 miles E. of Butte, Aug. 18, 1941, one specimen.

Idaho: Spencer, August 21, 1941, several specimens.

Linataenia fulva (Sager).

Localities.—Colorado: Jackson Co., 7–10 mi. W. of Cameron Pass, 9,000 feet elevation, Aug. 8, 1941, two specimens; Larimer Co., 7 mi. W. of Home, 8,500–9,000 feet elevation, Aug. 7, 1941, five specimens, and Cameron Pass, 10,000 ft., Aug. 8, 1941, two specimens.

PACHYMERINIDAE.

Genus **ZYGOMERIUM**, new genus.

Related to *Pachymerium* and *Eremerium* from which differing in having but 2 large pores or pits on posterior coxae instead of many small ones, and in having at most a membraneous terminal article or appendage on anal legs in place of a normal claw. Median piece of labrum distinct but not strongly developed, with teeth obsolete. First maxillae with telopodite two jointed; bearing two pairs of lappets. Second maxillae with coxae broadly united at middle; claw of palpus wholly smooth. Prehensors surpassing anterior margin of head; prosternum with chitinous lines well developed.

Ventral pores not detected in the genotype.

Genotype.—*Zygomerium euphanum*, new species.

Zygomerium euphanum, new species.

Cephalic plate longer than wide, widest behind middle; anterior margin slightly obtusely angled at middle; posterior margin straight; surface coarsely punctate and with a pair of sulci extending from caudal margin forward to middle.

A single, well defined chitinous spot. First maxillae with telopodite

distinctly two jointed; bearing two lappets on each side of which the distal one much exceeds the second joint.

Basal plate well overlapped by the cephalic; as wide posteriorly as the adjacent tergite, or nearly so. Claws of prehensors when closed reaching to end of first antennal article; claw armed within at base with an abortive denticle, the other articles unarmed. Prosternum unarmed anteriorly; chitinous lines distinct, long, being complete except at anterior end.

First spiracle large, vertically broad elliptic, the second intermediate in size and form, the following ones circular.

Most ventral plates showing at middle a sharply impressed transverse sulcus widely broken at the middle.

Last ventral plate broad, trapeziform. Coxal pits large, two on each side, these typically free or mostly so.

Anal legs with claw replaced by a slender membranous appendage.

Pairs of legs, mostly 65-67.

Length, to about 40 mm.

Locality.—New Mexico: West of Glencoe, June 1, 1941, numerous specimens, and two north of same place May 31; West of Ruidosa Junction, June 7, 1941, two specimens.

Zygomerium rotarium, new species.

The cephalic plate differs from that of *euphanum* in having the sides parallel, the width being uniform between the narrower anterior and posterior ends; caudal margin proportionately narrower than in *euphanum*. No frontal suture.

Second article of telopodite of first maxillae distally broadly rounded, bearing four setae on ventral face; lappet of first article long and thick.

Claw of prehensors armed at base with a well-developed conical tooth; prefemur bearing toward distal end a rounded, nodular tooth; other joints unarmed. Prosternum with anterior margin unarmed; chitinous lines distinct except at anterior end as in *euphanum*.

First spiracle large, vertically broadly elliptic, the following ones gradually decreasing in size and becoming strictly circular.

Last ventral plate broad, trapeziform but with caudal margin forming an obtuse, reentrant angle. Coxal pores covered by the sternite.

Anal legs clawless ending in a point but not bearing a definite membranous appendage such as present in *euphanum*.

Pairs of legs, 59.

Locality.—Utah: City Creek Canyon, Rotary Park, May 21, 1941, one female.

CHILENOPHILIDAE.

Arctogeophilus umbraticus (McNeill).

Locality.—Texas: Houston, September-December, 1941, one specimen taken by R. Scott.

Taiyna moderata Chamberlin.

Locality.—New Mexico: Tijeras, May 30, 1941, two specimens, hav-

ing respectively 47 and 49 pairs of legs. Previously known only from Monterey County, California.

Arctogeophilus xenoporus (Chamberlin).

Localities.—Utah: Garden City, Bear Lake, 5928 feet elevation, August 24, 1941, two specimens.

Idaho: 7 miles north of Georgetown, August 23, 1941, numerous; Humphrey, 6,500 feet elevation, August 20, 1941, several; Lava Hot Springs, August 22, 1941, several; Lund, 6,500 feet elevation, August 22, 1941, a young specimen.

Wyoming: Teton County, Turpin Meadows, August 13, 1941, one; Leeks Camp, August 13, 1941, one.

Colorado: Douglas County, 20 miles southwest of Sedalia, August 6, 1941, several specimens; Westcreek, August 5, 1941, two specimens.

SOGONIDAE.

Garrina alicea, new species.

Head rather small; widest behind middle; frontal suture present. Prebasal plate exposed.

Labrum conspicuously different from that of *G. paropoda* in lacking the characteristic secondary transverse fold; lateral pieces widely separated by the pectinate median fold much as in *Pycnona pujola* (See Bull. Univ. of Utah, Biol. Ser., Vol. VII, no. 3, pl. II, fig. 9), with outer portion smooth, bearing a few pectinae toward mesal ends.

Differing from *paropoda* also conspicuously in the first maxillae in which there are on each side two long lappets whereas in *alicea* the coxal lappet is absorbed and the second lappet does not extend beyond the end of the terminal article. This article in *alicea* bears 7 or 8 setae on its ventral face, whereas in that of the holotype of *paropoda* there are but 3.

Claws of prehensors when closed not surpassing anterior margin of head; all joints unarmed. Prosternum with no teeth anteriorly; chitinous lines complete.

First spiracle much enlarged, it and the following ones of anterior region elliptic and a little oblique, gradually decreasing in size and assuming the circular shape toward middle region.

Last sternite broad as usual. Two coxal pits of moderate size on each side.

Second tarsal joint of anal legs short, with its claw almost abortive.

Pairs of legs, 59–61.

Length, about 32 mm.

Locality.—Texas: Jim Wells County, 12 miles north of Alice, June 6, 1941, two females; Edinburg, June 4, 1941, one female paratype.

LITHOBIIDA.

ETHOPOLIDAE.

Bothropolys permundus (Chamberlin)

Localities.—Utah: Salt Lake County, Mill Creek Canyon, May 21,

1941, and 1943, several specimens on each date; 12 miles southwest of Garden City, August 28, 1941, and at Garden City, elevation 5,924 feet, August 24, 1941.

Idaho: 7 miles north of Georgetown at 6,500 feet elevation, August 23, 1941, many specimens.

GOSIBIIDAE.

Gosibius arizonensis Chamberlin.

Locality.—New Mexico: west of Ruidosa Junction, June 1, 1941, three specimens; west of Glencoe, June 1, 1941, 6 specimens.

Gosibius texicolens Chamberlin.

Locality.—Texas: Jim Wells County, 12 miles north of Alice, June 6, 1941, one specimen.

Gosibius aberrantus, new species.

Typically the dorsum is brown with an interrupted median longitudinal darker stripe; head of a somewhat orange cast with a darker spot at base; antennae also orange.

Antennae short, composed of about 26 articles. Ocelli in 3 longitudinal series; e. g., 1+4, 3, 2.

Prosternal teeth 3+3.

Posterior angles of none of dorsal plates produced.

Coxal pores small and circular; typically 5, 5, 5, 4.

Ventral spines of first legs, 0, 0, 3, 2, 1; dorsal, 0, 0, 3, 2, 2. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw unarmed. Ventral spines of anal legs, 0, 1, 3, 3 (2), 1; dorsal, 1, 0, 3, 1, 0; claw unarmed. Only last pair of coxae laterally armed.

Claw of female gonopods strictly entire; basal spines 2+2.

Anal and penult legs of male slender, with no obvious modifications.

Length of female holotype, 18 mm.

Localities.—New Mexico: West Ruidosa Junction, June 1, 1941 (holotype); Tijeras, May 30, 1941, one specimen; Fort Stanton, May 31, 1941, many specimens of both sexes; north of Glencoe, May 31, six specimens; 11 miles west of Thoreau, May 29, four; 3 miles north of Gallup, May 29, 1941, about ten specimens.

Distinguished from the related *G. arizonensis* in having prosternal teeth 3+3 instead of 2+2, in the fewer ocelli and in having only the last pair of coxae laterally armed.

Gosibius escabosanus, new species.

Dorsum brown.

Antennae of intermediate length, composed mostly of 22–25 articles.

Ocelli in three series; e. g., 1+5, 4, 2.

Prosternal teeth 2+2.

None of dorsal plates with posterior angles produced.

Coxal pores 3, 4, 4, 3.

Ventral spines of first legs, 0, 0, 2, 3, 2; dorsal, 0, 0, 2, 2, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw single. Ventral spines of anal legs, 0, 1, 3, 2; dorsal, 1, 0, 3, 1, 0; claw single. Last one or two pairs of coxae laterally armed.

Claws of female gonopods entire; basal spines 2+2.

Penult legs of male with fourth joint conspicuously elevated above at distal end, the lobe highest at caudal end from where sloping gradually proximad.

Length, 11 mm.

Locality.—New Mexico; Escobosa, May 30, 1941, one male and two females.

Distinguished from *G. texicolens*, a similarly small species, in spining of legs and modification of penult legs of male.

Guambius coloradanus Chamberlin.

Localities.—Colorado: Douglas County, 18–20 miles southwest of Sedalia, 7,000 feet elevation, August 6, 1941; several specimens; 2 miles south of West Creek, August 5, 1941; Raton Pass, August 4, 1941, two specimens.

Pseudolithobius megaloporus Stuxberg.

Locality.—California: 4 miles north of Badger, April 22, 1941, one specimen taken by Allen Mulaik.

LITHOBIIDAE.

Lithobius forficatus (Linne).

Localities.—Utah: Salt Lake City, many specimens taken at various dates in 1941, 1942 and 1943.

Wyoming: Natrona County, Casper, August 10, 1941, several specimens.

Neolithobius suprenans Chamberlin.

Locality.—Texas: Comal County, Spring Branch, July 14, 1941; four specimens.

Colorado: Raton Pass, August 9, 1941, one male, variant in having the ventral spines of the right anal leg 0, 1, 3, 2, 1, instead of the normal 0, 1, 3, 3, 2.

Tidabius tivius (Chamberlin).

Locality.—Utah: Salt Lake City, April, 1942, several specimens.

Nadabius coloradensis (Cockerell).

Localities.—Colorado: Jackson County, Cameron Pass, 9,000 feet elevation, August 8, 1941, numerous specimens; Larimer County, 7 miles west of Home, 8,500 feet elevation, August 7, 1941, many specimens and Home, same date; Cameron Pass, 10,000 feet elevation, August 8, 1941; Rustic, August 7, 1941, two specimens; Douglas County, 20

miles southwest of Sedalia, August 6, 1941, many specimens, and West Creek, August 5, also numerous specimens.

Wyoming: Woods Landing, elevation 8,000 feet, August 8, 1941, five specimens.

Montana: 18 miles E. of Butte, August 18, 1941, many specimens.

Nadabius iowensis (Meinert).

Localities.—Colorado: Manitou, August 5, 1941, two specimens.

Wyoming: Fremont County, 10 miles east of Shoshoni, August 11, 1941, about 10 specimens.

Nadabius mesechinus (Chamberlin).

Localities.—Idaho: Humphrey, 6,500 feet, August 20, 1941, many specimens.

Montana: 16 miles north of Dillon, August 19, 1941, three specimens.

Pokabius bilabiatus (Wood).

Localities.—Minnesota: Wright County, June, 1941, one specimen taken by J. H. Swanson.

Pokabius centurio Chamberlin.

Localities.—New Mexico: Escabosa, May 30, 1941, nine specimens; 5–11 miles from Tijeras, May 30, 1941, numerous specimens; 6 miles south of Mountainair, May 31, 1941, numerous; W. Ruidosa Junction, June 1, 1941, six specimens; W. of Glencoe, June 1, 1941, several specimens.

Pokabius utahensis (Chamberlin).

Localities.—Idaho: Georgetown, August 22, and 7 miles N. of Georgetown, August 22 and 23, 1941, many specimens.

Utah: Garden City on Bear Lake, August 24, and Preston Valley Picnic Grounds, Logan Canyon, August 25, 1941, many specimens.

Lophobius loganus Chamberlin.

Localities.—Idaho: Lava Hot Springs, August 22, and Georgetown, also August 22, 1941, several specimens at each place.

Arebius diplonyx (Chamberlin).

Locality.—New Mexico: W. of Ruidosa Junction, June 1, 1941, several specimens referred tentatively to this species, previously known from California.

Arebius convergens, new species.

Falling in the group with strictly entire claw in the female gonopods (*Arebius* sens. str.).

Near *A. epelus* which it resembles in having the articles of the antennae 21 instead of the more usual 20, but differing, e. g., in having the

ventral spines of the anal legs 0, 1, 3, 2, 1 or 0, 1, 3, 2, 0 instead of 0, 1, 3, 1, 0 and in not having anal and penult legs channeled along mesal side.

Ocelli typically in 3 series; e. g., 1+4, 3, 2.

Ventral spines of first legs, 0, 0, 1, 3, 1; dorsal, 0, 0, 2, 2 (1), 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw single. Dorsal spines of anal legs, 1, 0, 3, 1, 1; claw single. Dorsal spines of anal legs, 1, 0, 3, 1, 0; claw single. Last pair of coxae laterally armed with a minute spine or this spine obsolete.

Outer basal spine of female gonopods much stouter than the mesal one (Equal in *epelus*).

Length, up to 10 mm.

Locality.—New Mexico: N. of Glencoe, May 31, 1941, ten specimens (including holotype); Tijaras, May 30, many specimens; 6 miles S. of Mountainair, May 31, 1941, also many specimens.

***Arebius montivagus*, new species.**

Belonging in the group with partite claw on female gonopods; close to *A. diplonyx* from which it may be distinguished in having only the femora of first two pairs of legs with a single ventral spine instead of the first 7 or 8, and in having only the last pair of coxae laterally armed.

Antennae consisting of 20 articles. Ocelli in 3 or 4 series; e. g., 1+5, 5, 4 and 1+5, 5, 3, 1.

Coxal pores, e. g., 3, 4, 4, 4 (5).

Ventral spines of first legs, 0, 0, 1, 3, 1; dorsal, 0, 0, 1, 2, 1. Dorsal spines of the second legs, 0, 0, 2, 2, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claws 2. Ventral spines of anal legs 0, 1, 3, 2, 0; dorsal, 1, 0, 3, 1, 0; claws 2. Last pair of coxae laterally armed.

Claw of female gonopods distinctly tripartite, the lobes acute. Basal spines proportionately short and broad, of uniform width to the short, pointed apical portion much as in *diplonyx*.

Length, to 12 mm.

Locality.—Montana: 6 miles W. of Belgrade on Gallatin River, August 17, 1941, ten specimens; 4 miles N. of Divide, August 18, 1941, four specimens.

***Arebius fremontus*, new species.**

Also belonging in *Arebius* sens. str. in having the claw of female gonopods entire. In having the anal legs armed with a double claw agreeing with *A. elysianus* and *A. medius*, but differing from these, among other features, in having the ventral spines of the anal legs 0, 1, 3, 2, 0, instead of respectively 0, 1, 3, 3, 1 and 0, 1, 3, 2, 1.

Antennae short, consisting of 20 articles. Ocelli in 3 series; e. g., 1+5, 4, 2.

Prosternal teeth usually the ordinary 2+2, but in some specimens 2+3.

Coxal pores mostly 3, 4, 4, 3.

Ventral spines of first legs, 0, 0, 1, 3, 1; dorsal, 0, 0, 2, 1, 1. First four pairs of legs with but a single ventral spine on article 3. Ventral

spines of penult legs, 0, 1, 3, 3, 1; dorsal, 1, 0, 3, 1, 1; claw double. Last two pairs of coxae laterally armed.

Claw of female gonopods rather slenderly acuminate. Outer basal spine larger than the inner.

Length, up to about 10 mm.

Localities.—Wyoming: Fremont County, Brooks Lake Falls, August 12, 1941, nine specimens; Teton County, Turpin Meadows, August 13, about ten; Tower Falls, August 16, four.

Montana: 16 miles N. of Dillon, August 19, several specimens.

Arebius navajo, new species.

Near *A. tridens* but a smaller form differing in having the claw of the penult legs single instead of armed with a second claw and a spine, and in having last two pairs of coxae, instead of the last four, laterally armed.

Antennae consisting of 21 to 23 articles. Ocelli in 3 series; e. g., 1+4, 4, 3.

Coxal pores 2, 3, 3, 2.

Ventral spines of first legs, 0, 0, 1, 2, 1; dorsal, 0, 0, 1, 2, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2 (1); dorsal, 1, 0, 3, 1, 1. Ventral spines of anal legs, 0, 1, 3, 2, 0; dorsal, 1, 0, 3, 1, 0; claw single.

Claw of female gonopods tripartite but only two lobes well developed, the outer lobe being almost obliterated.

Length, to about 11 mm.

Localities.—New Mexico: Escabosa, May 30, 1941, twelve specimens; W. of Glencoe, June 1, five specimens.

Arebius tetonus, new species.

Resembling *A. tridens* in having the claw of the female gonopods tripartite and in having the claw of the penult legs double. It differs in smaller size, in having only the last one or two pairs of coxae laterally armed, in having the articles of the antennae normally 20 instead of 21, and in much fewer ocelli in 2 series instead of 3; e. g., 1+4, 3.

Coxal pores, 3, 4, 4, 4.

Ventral spines of first legs, 0, 0, 1, 2 (3), 1; dorsal, 0, 0, 1, 2, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw armed with secondary claw and spine. Ventral spines of anal legs, 0, 1, 3, 2 (3), 0; dorsal, 1, 0, 3, 1, 0; claw single.

Claw of female gonopods distinctly tripartite; basal spines short and relatively broad as in *dolius*, etc.

Length, near 10 mm.

Locality.—Wyoming: Teton County, Leeks Camp, September 13, 1941, eight specimens; Canyon, August 15, 1941, nine specimens; Madison Jct., August 15, a male and female.

SCUTIGERIDA.

SCUTIGERIDAE.

Scutigera coleoptrata (Linne).

Locality.—Texas: Dallas County, N. E. of Dallas (White Rock Lake), May 1, 1941, two specimens.

Scutigera lincei (Wood).

Texas: Jim Wells County, 12 miles N. of Alice, June 6, 1941, several small specimens referred tentatively to this species.

Scutigera dorothea, new species.

Like *S. homa*, of Arizona, in its light ferruginous color, showing no definite longitudinal stripes. Legs lighter, without annuli.

Differing from *S. homa* in the antennae, the first division of which is notably shorter, consisting of only about 47 articles as against 80 in *homa*. Second division composed of about 125 segments.

First division of tarsus of leg I composed of 12 articles, the second division of about 28. First division of tarsus of leg II, of 11 articles; of leg III of 10 articles; of leg IV of 8; of leg V, 6 and of leg VI, 7.

Stomata short, scarcely at all projecting into the caudal emargination.

Caudal margin of last tergite (i. e. of the 8th) nearly straight, not emarginate as in *homa*.

Gonopods of female much more divergent than in *homa* (cf. fig. in Ent. News, 53, p. 10, 1942), with the claws proportionately decidedly longer.

Length of female holotype, 12 mm.

Localities.—Texas: Brewster County, 4 miles W. of Alpine, June 2, 1941, five specimens, including the holotype; Val Verde County, Langtry, June 3, 1941, one specimen.

Scutigera phana, new species.

Differing from *S. lincei* in lacking a median longitudinal dark stripe on dorsum, but with a narrow dark stripe along each side, the broader mid-dorsal region and the lateral borders being pale yellow; last dorsal plate entirely dark and the head entirely pale. Posterior legs in part inclined to be dusky purple between femur and middle of first tarsal division, elsewhere yellow; other legs paler throughout, not annulate. Antennae yellow.

First division of antennae composed of about 36 very short articles, the second of about 96.

First division of tarsus II composed of 10 articles, the second division of 22. First division of tarsus III of 9 articles; of tarsus IV of 7 articles; of tarsus V and IX each of 6 articles.

Stomata very short. Caudal margin of last tergite not emarginate.

Gonopods of female strongly divergent and with claws relatively long, nearly as in *dorothea*.

Length, 9.5 mm.

Locality.—Texas: Hidalgo County, Edinburg, June 8, 1941, one female.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE MEXICAN SNAKES OF THE GENERA *SONORA*
AND *CHIONACTIS* WITH NOTES ON THE
STATUS OF OTHER COLUBRID GENERA.¹

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The primary purpose of this paper is to present a revision of the *michoacanensis* group of the genus *Sonora* and to discuss the generic position of this group. Circumstances have made it advisable to include all projected taxonomic changes in *Sonora*, and to give ranges, and localities in Mexico, for the forms of *Sonora* and *Chionactis* occurring in that country. The concepts of several species and subspecies of *Sonora* are altered and the monotypic genus *Chionactis* is recognized for the very distinct species *occipitalis*. A new key to all the snakes of these genera is appended. Notes are given on several other colubrid genera which have been associated with *Sonora* or are believed to be related to this genus. This paper supplements my previous treatments of the *S. semiannulata* and *S. occipitalis* groups (1938 and 1941), and like them is intended as a preliminary work.

The species *michoacanensis* was placed in the genus *Contia* by the original describer, Dugès, and by Cope in two publications, but most authors have followed Boulenger (1896) in assigning it to *Scolecophis*. Dunn (1928) and Taylor (1937) allocated the species to *Sonora*, and both writers pointed out the possibility that *michoacanensis* was also congeneric with *Scolecophis atrocinctus*. If this arrangement were followed

¹ Extracted from material prepared in partial fulfillment of the requirements for the doctoral degree at the University of Michigan.

the inclusive genus (*Sonora* plus *Scolecophis*) would take the older name, which is *Scolecophis*.

A comparative study of the *michoacanensis* and *semiannulata* groups revealed a very close agreement in scutellation, teeth, dentigerous bone structure, microscopic scale striation, and color pattern. There are hemipenial differences between the two groups, but they do not indicate relationship of *michoacanensis* to *Scolecophis*. It is evident that Dunn and Taylor were correct in assigning *michoacanensis* to *Sonora*.

In search of information on generic relationships, the maxillary, transverse, palatine, and pterygoid bones (which can be removed without injury to the specimen) of a number of genera were studied and several trenchant points of difference between *Sonora* and *Scolecophis* were found.² These characters are contrasted in the tabulation that follows.

Sonora.

1. Palatine anteriorly ends at its maxillary process. Palatine teeth 6 to 9.
2. No postdental process on maxillary, or occasionally a very small one.
3. Pterygoid broad, with abrupt, oblique end. Pterygoid toothed to end of alveolar edge.
4. Teeth not flattened, tips pointed.
5. Outer arm of transverse rod-like or flattened.
6. Three enlarged posterior maxillary teeth.

Scolecophis and *Tantilla*.

1. Palatine anteriorly extends beyond its maxillary process, bearing 2 to 4 teeth anterior to the maxillary process. Palatine teeth 11 to 16.
2. Large postdental process present on maxillary, about equal in length to the enlarged maxillary teeth (behind which it stands).
3. Pterygoid very narrow (from rather broadly saber-shaped to almost linear), tapering gradually to end. Pterygoid with long, toothless tail portion.
4. Teeth flattened anteroposteriorly (usually conspicuously so), tips appearing rounded when viewed anteriorly.
5. Ventral edge of outer arm of transverse strongly extended downward around the end of the maxillary.
6. Two enlarged posterior maxillary teeth.

Scolecophis and *Tantilla* stand out as representatives of a distinct generic group. They are apparently inseparable on jaw characters and, as previous authors have believed, they are certainly intimately related.

²The specimens of which the bones mentioned above were studied are distributed thus: *Sonora*, 17; *Procinura*, 1; *Chionactis*, 3; *Toluca*, 2; *Chilomeniscus*, 2; *Stenorhina*, 5; *Ficimia*, 1; *Scolecophis*, 3; *Tantilla*, 5 (1 each of the following species: *rubra*, *semicincta*, *boulengeri*, *coronata*, *gracilis*).

Their retention as distinct genera is justified, however, as *Scolecophis* differs from *Tantilla* by having a loreal, scale pits and angulate ventral scutes, and apparently differs from *Tantilla* (and from *Sonora*) in the possession of large hemipenial spines placed opposite the sulcus instead of occurring along the sulcus. I am not sufficiently familiar with the various groups of tantillas to know whether this penial distinction is constant.

The characters given for *Sonora* in the table above apply equally well to the closely related genera *Procinura*, *Chionactis*, and *Toluca*, and also apply to the more distantly related *Chilomeniscus*. The data of Taylor and Smith (1942) indicate that *Pseudoficimia* and *Conopsis* are other genera of this group. *Stenorhina* agrees with the characters listed for *Sonora*, but differs in its definitely opisthoglyph teeth. In the latter respect it is approached by occasional members of the other genera, so present evidence does not determine whether or not *Stenorhina* may be associated with this assemblage of genera.

The nearest relative of *Sonora* is apparently the monotypic genus *Procinura*, which has been found at only three places, all in the Rio Fuerte drainage of Sonora and Chihuahua. *Procinura aemula* is almost indistinguishable from typical *Sonora* in hemipenis, teeth, structure and shape of dentigerous bones and head scutellation. The scales of the caudal region of *Procinura* are strikingly modified by protuberant keels which have a free spinous tip near the posterior margin. The color pattern of *Procinura* is developed along a different line than that seen in any described form of *Sonora*.

It is believed that *Sonora*, *Procinura*, *Chionactis*, *Toluca*, *Conopsis*, *Pseudoficimia*, *Chilomeniscus*, and perhaps *Stenorhina* and *Ficimia*, are members of one generic group, or tribe, and that *Scolecophis* and *Tantilla* belong to another group of, at best, distant relationship to the above group. Various other genera which would probably fit into one of these two series have not been available to me for dissection.

Sonora was commonly united with *Contia* by the earlier writers and the two genera are regarded by most modern herpetologists as being closely related. Externally they are very much alike, the only constant, tangible differences being in the coloration. However, study of the skull and hemipenis proved *Contia tenuis* to be totally unrelated to *Sonora*. Contrary to previous statements, *Contia* has a sulcus which is apically forked. Cope's figure of the hemipenis, the basis of this error, appears to have been drawn from a specimen of *Sonora*. The tooth-bearing bones are all very slender and are entirely different in shape from those of *Sonora* and its relatives. The teeth are slim, isodont, ungrooved and about half as numerous as in *Sonora*. Perhaps *Contia* may best be thought of as a monotypic xenodontine genus related to *Rhadinaea*. I hope to discuss this genus in more detail elsewhere.

The three posterior maxillary teeth of *Sonora* are moderately enlarged and each bears a posterolateral flange in front of which there is a shallow but distinct groove. This groove is decidedly lateral in position and is very different from the channel of true opisthoglyphs such as *Trimor-*

phodon and *Coniophanes*. The confusion of the two types of dentition in the past has led to many mistaken ideas and groupings. Dentition extremely similar to that of *Sonora* occurs in the related genera *Chionactis*, *Toluca*, *Chilomeniscus*, and apparently in *Pseudoficimia*. *Tantilla* and *Scolecophis* have lateral grooves much as in *Sonora*, but the edge of the posterolateral flange has a slight tendency to bend forward and more or less arch around the groove. By a continuation of this line of development a truly opisthognath tooth might be evolved.

Posterolateral flanging and lateral grooving of the teeth may be developed in varying degrees, as in and between the very closely related genera *Conopsis* and *Toluca*, but qualitatively this type of dentition is sufficiently constant and characteristic to deserve a descriptive name. Such a designation will serve to emphasize the important distinction between snakes with teeth of this sort and those which are truly opisthognathous or aglyphous. As no name seems to have been previously proposed for it, this dental type may be termed pleuroglyphous.

Genus *Sonora*.

Sonora michoacanensis agrees with the genotype, *S. semiannulata*, in most essentials, and in color approaches the *semiannulata* group closely through two forms described below. However, the two groups are readily separable by the penial characters listed below. The data are based on *S. m. michoacanensis* (Field Mus. 37141), *S. m. mutabilis* (Amer. Mus. 19714 and 19716) and on numerous specimens representing most of the forms of the *S. semiannulata* group.

S. michoacanensis group.

1. Several of the lower rows of calyces with spinous papillae.
2. Calyces distinctly papillate.
3. 3 to 7 small and medium sized spines on plane of the large basal, sulcar spines and below zone of small spines.
4. Without spines alongside the large basal spines.
5. Spines in zone of small spines appearing hooked, due chiefly to the greater sigmoid curvature of the whole spine.
6. Smaller acalyculate area between apical lobes.
7. Length of hemipenis 9, 10, and 11 caudals (in 3 specimens).

S. semiannulata group.

1. One, or at the most two, of the lower rows of calyces at all spinous.
2. Calyces with short, triangular lobes (except at top of hemipenis).
3. 8 to 14 small and medium sized spines on plane of the large basal, sulcar spines and below zone of small spines.
4. Almost always with a spine beside each basal spine.
5. Spines in zone of small spines not hooked, the whole spine with only a slight sigmoid curvature.
6. Well developed acalyculate area between apical lobes.
7. Length of hemipenis 11 to 15 caudals, usually 12 or 13.

The *michoacanensis* group is remarkable for its brilliant, extremely variable, sex-correlated pattern. The males of *mutabilis* are almost as different from the females as either is from *michoacanensis*, and different regions of the body of one snake may be as diverse as distinct species usually are. These snakes are not only local in their distribution, but rare to all collectors; the three recognized forms are known from only 18 specimens.

Sonora m. michoacanensis (Dugès).

Contia michoacanensis Dugès (Cope), 1884 (1885), Proc. Amer. Philos. Soc. XXII, pp. 178–179. (Michoacan, Mexico.)

Cope, 1887, Bull. U. S. Nat. Mus. no. 32, p. 81.

Elapomorphus michoacanensis Cope, 1895, Trans. Amer. Philos. Soc. XVIII, p. 218; hemipenis pl. XXIX, fig. 6.

Homalocranium michoacanense (part) Günther, 1895, Biol. Cent. Amer. p. 150.

Dugès, 1896, La Nature, ser. 2, vol. 2, pp. 482, 485.

Chionactis michoacanensis Cope, 1896, Amer. Nat. XXX, p. 1024.

Cope, 1898 (1900), Ann. Rep. U. S. Nat. Mus., p. 936.

Scolocophis michoacanensis (part) Boulenger, 1896, Cat. Sn. Br. Mus. III, p. 211, 212.

Cope, 1898 (1900), Ann. Rep. U. S. Nat. Mus., p. 1109.

Gadow, 1905, Proc. Zool. Soc., vol. 2, no. 15, p. 225.

Werner, 1924, Arch. Nat. IX (A12) pp. 144, 145.

do Amaral, 1929, Mem. do Inst. Butantan, tomo IV, p. 218 (92).

Taylor, 1933, Copeia, no. 2, p. 97.

Sonora erythrura Taylor, 1937, Herpetologica, vol. 1, no. 3, pp. 69–71, pl. VI, fig. 1. (Taxco, Guerrero, Mexico).

Type.—The type specimen is apparently lost. Dr. Hobart M. Smith found that the supposed type specimen at present in the Museo Alfredo Dugès, Colegio del Estado de Guanajuato, not only fails to agree with the type description, but comes from Guerrero. The Dugès specimen from Michoacan, now in the British Museum (no. 1903.3.21) is the most suitable choice for neotype and is so designated.

Diagnosis.—Differs from all members of the *semiannulata* group in having a distinctly tricolor pattern, at least anteriorly, and from the other members of the *michoacanensis* group in having an unbanded tail, except insofar as the last body band may overlap the base of the tail.

Range.—Known only from Guerrero and Michoacan, Mexico. According to Dr. Smith, the three definite localities (see table of data) all lie within the Lower Balsan biotic province (Smith 1939, p. 15, 1940), although small scale maps of the biotic areas cannot show this connection.

Author of name.—Cope has always been considered the describer of this species because the name and description first appeared in one of his papers. However, in the original description the name appears, "*Contia michoacanensis* Dugès MS." In subsequent publications Cope cited Dugès as the describer. Article 21 of the International Code of Zoological Nomenclature applies to this case;

TABLE 1

DATA ON THE KNOWN SPECIMENS OF *Sonora michoacanensis michoacanensis*.

Collection.	Number of specimen.	Locality.	Sex.	Ventrals.	Caudals.	Black body		Source of data.
						Gray body by red (excluding nuchal).	bands not split by red (including nuchal).	
? ?	?	Michoacan	♂?	152	37(+?)	8	2	Orig. desc.
Brit. Mus.	1903.3.21	Michoacan	♂	165	44	12	3	H. W. Parker.
Field Mus.	37141	Apatzingan, Michoacan.	♂	152	43	1	0	Spec. exam.
Taylor-Smith	5440	10 mi. S. of Taxco, Guerrero.	♂	163	47	15	7	E. H. Taylor, 1937.
Dugès Museo.		Guerrero.	♀	177	43+	21	13	H. M. Smith.
Mus. Comp. Zoology.	33650	Chilpancingo, Guerrero.	♀	175	47	18	10	Spec. exam.
Field Mus.	39128	Apatzingan, Michoacan.	♀	172	36	8	0	Spec. exam.
Field Mus.	39129	Apatzingan, Michoacan.	♀	171	39	12	1	Spec. exam.

DATA ON THE KNOWN SPECIMENS OF *Sonora michoacanensis mutabilis*.

Collection.	Number of specimen.	Locality.	Sex.	Ventrals.	Caudals.	Black body		Source of data.
						Gray body by red bands, incl. nuchal.	bands not split by red.	
Amer. Mus.....	19714.....	Federal Dist.....	♂	166	43 +	15	0	Spec. exam.
Amer. Mus.....	19716.....	Federal Dist.....	♂	163	48	15	0	Spec. exam.
Taylor-Smith....	4659.....	Near Magdalena, Jalisco.	♂	162	45	17	2	Spec. exam.
Taylor-Smith....	4661.....	Near Magdalena, Jalisco.	♂	162	45	15	0	Spec. exam.
Brit. Mus.....	92.10.31.42.....	Mezquitral del Oro, Zacatecas.	♂	160	45	12	0	H. W. Parker.
Brit. Mus.....	92.10.31.43.....	Mezquitral del Oro, Zacatecas	♂	166	46	18	0	H. W. Parker.
Amer. Mus.....	19715.....	Federal Dist.....	♀	173	37 +	31	25	Spec. exam.
Amer. Mus.....	Tied with 19714-6.	Federal Dist.....	♀	173	43	27	23	Spec. exam.
Taylor-Smith....	4660.....	Near Magdalena, Jalisco.	♀	168	40 +	26	17	Spec. exam.

"The author of a scientific name is that person who first publishes the name in connection with an indication, a definition, or a description, unless it is clear from the contents of the publication that some other person is responsible for said name and its indication, definition, or description."

Since Cope has made it very clear that Dugès was responsible for the description of this species, and since there is no reason to suspect that the name itself was coined by Cope, the species should be attributed to Dugès.

Remarks.—In the snakes of the *Sonora michoacanensis* group the only units of color pattern that provide counts practical for purposes of comparison are the grayish bands. This is due to the fact that even on different parts of one individual the red bands vary in size from several scales in length to nothing, and the black bands reciprocally present all degrees of splitting or fusion.

A photograph of this subspecies appears in Taylor, 1937, pl. VI, fig. 1.

***Sonora michoacanensis mutabilis* subsp. nov.**

Homalocranium michoacanense Günther, 1895, Biol. Cent. Amer., p. 104, 150, pl. 36, figs. B and C.

Scolecophis michoacanensis (part) Boulenger, 1896, Cat. Sn. Br. Mus., vol. 3, pp. 211–212.

Sonora michoacanensis Dunn, 1928, Amer. Mus. Novitates, no. 314, p. 2.

Taylor, 1937, Herpetologica, vol. 1, no. 3, pp. 71–72, pl. 6, fig. 2.

Holotype.—Collection of E. H. Taylor and H. M. Smith, no. 4661, male, taken near Magdalena, Jalisco, Mexico, by Dr. Hobart M. Smith, on July 29, 1935.

Paratypes.—E. H. Taylor—H. M. Smith numbers 4659 and 4660 from type locality; British Museum of Natural History numbers 92.10.31.42 and 92.10.31.43 both from Mezquital del Oro, Zacatecas (not Jalisco); American Museum of Natural History numbers 19714, 19715, 19716 from the Federal District.

Range.—Known from Jalisco, extreme southern Zacatecas and from the Federal District of Mexico. This distribution suggests that the form is characteristic of the Austro-occidental biotic area.

Diagnosis.—Distinguished from *S. m. michoacanensis* by the banded tail, and from the following species by the narrowness of the grayish bands, which are much shorter anteroposteriorly than are the unsplit black bands.

Description of holotype.—See also table of data. Taylor, 1937, describes the type and the Jalisco paratypes.

Male; scale rows 15–15; nasals divided below; loreals nearly square; temporals 1–2; supralabials 7; infralabials 6; first three infralabials touch anterior chin shields and only the fourth touches the posterior chin shields, which are separated by a single small scale; seven rows of irregular small scales anterior to ventrals; oculars 1–2; sixth upper labials scarcely larger than fourth or fifth.

Abdomen of preserved specimen light coral, becoming light brownish coral on sides and back; chin and upper lip white; snout dark gray; black

crescent from nasals around eyes and over back of head from anterior end of frontal to two-thirds of the way back on the parietals; nuchal band starting on second row of neck scales and extending backwards eight rows and downward, barely touching ventrals; rest of black bands two scales long, the second band touching ventrals, and a few posterior ones faintly reaching abdomen; light bands distinctly grayish; black bands all split by red, but least split between tenth and eleventh sets, where the red band is only one and one-half scales long as contrasted to seven between first and second sets; tail with three sets of bands separated by red areas thirteen scales long; two anterior sets of bands encircle tail.

Remarks.—A female of this subspecies is well shown by Taylor (1937, pl. 6, fig. 2). Günther (1895, pl. 36, figs. B and C) depicts two males in color. It is probable that Günther was incorrect in portraying the light bands as yellow rather than gray.

The name *mutabilis* refers to the process of pattern change of which different stages are easily visible in the contrast between the sexes, and even on different regions of a single female specimen.

Sonora, species.

?*Contia episcopa isozona* Dugès, 1896, *La Naturelle*, 2nd ser., vol. II, cuaderno 11, p. 481. (Zitácuaro, Michoacan).

?*Scolecophis atrocinctus* Cope, 1887, *Bull. U. S. Nat. Mus.* 32, p. 83 (Toluca).

Günther, 1895, *Biol. Cent. Amer.*, p. 156 (Toluca).

Gadow, 1905, *Proc. Zool. Soc. Lond.*, p. 225 (Toluca).

?*Homalocranium atrocinctum* Gadow, 1905, *Proc. Zool. Soc. Lond.*, p. 233 (Toluca).

An undescribed species is apparently represented by an uncatalogued specimen (bearing an old metal tag no. 6444) in the University of Michigan Museum of Zoology. The species is sufficiently distinct to be described from the single specimen, but the snake bears no acceptable locality data. I am unwilling to name the species because the type locality is unknown, and also because its diagnostic differences lie in the color pattern, which is fantastically variable in this group of the genus.

Locality.—The snake is in a bottle with two skins and a slip of paper citing W. B. Richardson as collector, Matagalpa, Nicaragua as locality, and May 6, 1893, as date of receipt. Richardson's data on collections have been proved erroneous for a variety of species. Dr. Emmett R. Dunn, who has made a study of the several Richardson collections, states that Richardson was in the Plateau region of Mexico, apparently traveling somewhat, before he settled at Matagalpa, Nicaragua. Dr. Dunn found that the 1893 consignment seemed to be entirely Mexican, but was sent from Matagalpa and became so labeled.

An *Anolis cumingii* specimen in the Stanford University Museum bearing the locality "La Paz, Mexico," was collected by "Mr. Richardson" in 1895. Dr. H. M. Smith suggests that the collector is probably the same W. B. Richardson, and that the La Paz referred to is most likely to have been La Paz, Puebla. Four other towns of this name in Mexico

he considers unsuitable ecologically for this *Anolis* and other lizards collected by Richardson. The region has been but poorly worked and may well be the source of some of Richardson's unusual specimens.

Dr. Smith informs me that there are no specimens or records of *Scolocophis atrocinctus* from Mexico except for the above-cited Toluca record of Cope, which was copied by Günther and Gadow. Dr. Smith believes that there is no known Mexican snake to which Cope might have applied this name except for the species under discussion. This Toluca record, coupled with Dugès' record of *Contia episcopa isozona* from nearby Zitácuaro, creates a probability that there is, in that region, a dark-and-light-banded snake not represented in our museums, unless by the Richardson specimen.

The two skinks that accompanied the snake were identified by Dr. Joseph R. Bailey as *Eumeces l. lynce*. According to Taylor (1936, p. 172) this lizard is a high mountain or plateau form known from the states of Vera Cruz, San Luis Potosí, Hidalgo, Puebla, Guanajuato, and perhaps parts of Guerrero and Michoacan. This region overlaps the known range of *mutabilis*, but in general lies more to the east.

We conclude that the Richardson specimen probably came from an area within or somewhat to the east of the ranges of *mutabilis* and *michoacanensis*, on the southern part of the Mexican Plateau or in the surrounding mountains.

Description.—The specimen is a female having 15–15 scale rows, 178 ventrals and 38 caudals. The nasals are divided below the nostril; the loreal is lacking on one side; preoculars 1, postoculars 2, the upper one larger; temporals 1–2; supralabials 7, infralabials uncountable; posterior chin shields in contact.

The snake appears to be faded, and no colors other than black and white are evident. There is a distinct head crescent. The body bears 26 black bands that are about 4 scales long anteroposteriorly. None of the body bands reaches the abdomen. The second and third bands are deeply notched laterally, probably showing the beginning of the splitting process. None of the posterior body bands shows any real signs of splitting, nor does the first body band. The light bands are about equal in size to the black bands, a condition which is unknown in *mutabilis* and *michoacanensis*. The tail is banded in triads as in *mutabilis*. There are 4 primary light bands on the tail and 3 other light areas, presumably once red, which are 5 or 6 scales long. The caudal black bands are about 2 scales long; the two anterior ones encircle the tail.

Remarks.—This species is intermediate in color pattern between *michoacanensis* and *mutabilis* on one hand and the forms of the *semiannulata* group on the other. I believe that the bicolor condition is more generalized, and in *Sonora* more primitive, than the tricolor arrangement. Hence, this species may be considered as representing a stage in pattern development through which the other two races of the group must have passed. Some of the females of *mutabilis* are not greatly different from the Richardson specimen, but the known *mutabilis* specimens have at least a few of the anterior black bands split by red, and their light bands are much narrower than the unsplit black bands.

Sonora mosaueri Stickel.

Sonora mosaueri Stickel, 1938, Copeia, no. 4, pp. 189–190.

Type locality.—Comondu, Baja California.

Range.—Known only from the vicinity of Comondu (Mus. Vert. Zool. 13770–3; U. S. Nat. Mus. 67381).

Remarks.—This species is very closely related to *semiannulata*, of which it may prove to be a subspecies.

Sonora semiannulata semiannulata Baird and Girard.

Sonora semiannulata Baird and Girard, 1853, Cat. N. Amer. Rept., pt. 1, p. 117.

Type locality.—It is proposed to restrict the type locality, originally given as "Sonora, Mexico," to the vicinity of the Santa Rita Mountains of Arizona. The reasons for this change are discussed below. The holotype is U. S. Nat. Mus. no. 2109.

Range.—This form, as here defined, is known only from the region of the Santa Rita Mountains, Arizona. Its discovery in the Sierra Madre Occidental of Mexico is to be expected.

Taxonomic notes.—It has long been known that the ventral and caudal counts of the type specimen are significantly lower than those of any other specimens included in *S. s. semiannulata*, but inasmuch as the type has certain peculiarities of cephalic scutellation (i. e., symmetrically divided supraoculars) it was thought that the ventral counts might be merely a correlated abnormality. A specimen with almost identical ventral and caudal counts, but with undivided supraoculars, has now come to notice. It is number 3419 in the Royal Ontario Museum of Zoology and was collected in the Santa Rita Mountains, Arizona, by Dr. F. H. Snow in 1907. It reached the Ontario Museum via F. A. Hartman, with eight other reptiles of Snow's 1907 Santa Rita collection. This snake is very small, 119 mm. in total length, but is apparently normal in all respects. The holotype, 244 mm. long, is medium-sized for a *Sonora*.

Both specimens are males. The U. S. N. M. snake has 153 ventrals and 41 caudals, the R. O. M. Z. specimen 154 and 43. The scale rows of both are 15–14. In *isozona*, the form that occurs east, north and west of *semiannulata* and which has been lumped with it, the caudal scales of males vary from 49 to 63 in 50 specimens, averaging 53.94 (standard error of the mean 0.396, standard deviation 2.80). The ventrals of the *semiannulata* specimens are at the extreme lower end of the range of variation in *isozona*. The ventral plus caudal figure for males of *isozona* varies from 204 to 230, averaging 213.76 (standard error of the mean 0.809, standard deviation 5.726) whereas in the *semiannulata* specimens it is 194 and 197. In *Sonora* such differences are of considerable diagnostic importance.

The R. O. M. Z. specimen has three enlarged, laterally-grooved, posterior maxillary teeth as would be expected. The type has not been dissected.

It becomes important to determine within what area the type locality may lie, and whether this area includes the Santa Rita mountains. The type locality, "Sonora, Mexico," as used by Baird and Girard in connection with the Graham and Clark collection, refers almost entirely to Arizona south of the Gila River. Graham's party was in what is now Sonora only while making a hurried trip to Santa Cruz and back through the upper Santa Cruz Valley. I have studied Graham's detailed account of his trip. Certain localities mentioned by him were fixed with the help of old maps and documents in the National Archives, and his route was followed on large scale topographic maps. It was concluded that Graham's party went only as far west as the southeastern base of the Santa Ritas, which was approached from the northeast. They then headed southeast along the northern slopes of the Canelo Hills to a point where they could cut through to the headwaters of the Santa Cruz River, which was then followed southward to the town of that name. From Santa Cruz they returned directly to New Mexico by an unstated route.

Since the R. O. M. Z. Santa Rita specimen closely resembles the type specimen, while snakes from the nearby Huachuca Mountains are *isozona*, it seems highly probable that the type was collected in the region of the Santa Rita Mountains, Santa Cruz County, Arizona.

Sonora semiannulata isozona (Cope).

Contia isozona Cope, 1866, Proc. Acad. Nat. Sci. Phila., p. 304.

Sonora miniata miniata Stickel, 1938, no. 4, p. 187 (Mesa, Arizona).

Type locality.—Fort Whipple, Yavapai Co., Arizona. The holotype is U. S. N. M. no. 11417. It was collected by Dr. E. Coues in 1865.

Range.—Southern Idaho, Utah, Nevada, Arizona (exclusive of the ranges of *S. s. gloydii* and *S. s. semiannulata*), the Panamint Mountains of California, and south in Baja California at least to Santa Rosalia.

Mexican localities.—The only definite Mexican station for this race is Santa Rosalia, in the southern district of Baja California (Mus. Hist. Nat. Paris). It is to be expected in Sonora and, perhaps, in western Chihuahua. The Field Museum has a specimen (no. 1541), apparently of this subspecies, which is supposed to have come from the rather unlikely locality of Jaral, Coahuila. Dr. H. M. Smith has encountered specimens of *Salvadora* and *Sceloporus* in the same collection, recorded as taken at Jaral by the same collectors, for which this locality seems improbable on both geographic and ecological grounds. Hence, this puzzling *Sonora* record may be considered as very dubious.

Taxonomic notes.—*S. m. miniata* is here synonymized with *S. s. isozona*. The form resulting from this combination may be completely patterned with cross bands and a head crescent, or entirely unbarred, with the head dusky well back onto the nape. Intermediate patterns are not known, except that the plain specimens occasionally have a nuchal band. These color phases occur together in some localities, but frequently they are segregated in local colonies of one phase. It has become increasingly clear that the best interpretation of this condition is based upon the

assumption that the character of dusky nape and head is genetically linked with the gene for unbanded body, and that the modifying genes producing intermediates between the color phases in *blanchardi* and *episcopa* are lacking in *isozona* or are suppressed by some one gene. The effect could also be produced by different alleles of the genes involved, or by several other genetic mechanisms. As regards the colonial segregation of the phases, it is a recognized fact that semi-isolated populations tend to acquire different combinations of the variable characters and become standardized for these combinations. (For a discussion of such phenomena see Dobzhansky (1937, especially pp. 47–55, 133–138, 146–148). There are several other instances of local or regional color-phase stereotypy in this genus.

Scattered throughout the range of *isozona* are individuals which are apparently, and probably genetically, indistinguishable from *linearis*. These striped specimens constitute less than 15% of the population of *isozona*. Practically all true *linearis* are readily recognizable as such. Since so large a percentage of each race is properly identifiable, recognition of both subspecies is justified.

In western Arizona and southern Nevada, where *linearis* and *isozona* intergrade, the tendency toward striping is most manifest and may even be discerned in banded individuals.

Sonora semiannulata linearis Stickel.

Sonora miniata linearis Stickel, 1938, Copeia, no. 4, p. 189.

Type locality.—Seeley, Imperial Co., California.

Range.—Extreme northeastern Baja California, southeastern California in Imperial Co., eastern San Diego Co., Riverside Co., and southeastern San Bernardino Co.

Mexican locality.—Mt. Mayor Cocopah, in Cocopah Range (Phil. Acad. 16101).

Sonora semiannulata blanchardi Stickel.

Sonora semiannulata blanchardi Stickel, 1938, Copeia, no. 4, pp. 185–186.

Type locality.—Northeastern slopes of Chisos Mountains, Brewster Co., Texas.

Range.—Known only from Brewster Co., Texas, and Chihuahua, Mexico. Specimens from the vicinity of El Paso, Texas and the upper Rio Grande Valley of New Mexico are intergrades with *S. s. isozona*.

Mexican localities.—Chihuahua: 20 miles S. of Chihuahua City (Taylor-Smith 4681), Lake Santa Maria (U. S. N. M. 46591). This subspecies must occur in Coahuila, and possibly in Nuevo Leon as well. (See note under *S. e. episcopa*).

Sonora episcopa episcopa (Kennicott).

Lamprosoma episcopum Kennicott, 1859, U. S. and Mex. Bound. Surv., p. 22, pl. 8, fig. 2.

Type locality.—Eagle Pass, Maverick Co., Texas. The type locality may prove to have been but a shipping point. The U. S. N. M. speci-

men 2042, the first specimen mentioned in the original description is now designated as lectotype.

Range.—From Nuevo Leon, Mexico, northeast to St. Clair Co., Missouri; west through Russel Co., Kansas, to southeastern Colorado; south through eastern New Mexico to the Pecos Valley of Texas.

Mexican localities.—Boulenger (1894, p. 265) lists two specimens, "a" and "b," from Nuevo Leon. The counts given for specimen "b" agree well with *episcopa*, but those given for specimen "a" are either wrong or the specimen is an odd *blanchardi*, or is an intergrade between *blanchardi* and *episcopa*. With this possible exception, no intergrades between these two forms are known.

Sonora episcopa taylori (Boulenger).

Contia taylori Boulenger, 1894, Cat. Sn. Br. Mus., vol. 2, p. 265, pl. 12, fig. 3.

Type locality.—Duval Co., Texas, and Nuevo Leon, Mexico, are both mentioned in the original description. Since the closely related form *S. episcopa episcopa* is also recorded from Nuevo Leon, the type locality may be restricted to Duval Co., Texas, where *taylori* has been taken repeatedly, but *episcopa* never. Boulenger's specimen "a," a male with 126 ventrals, may be designated the lectotype.

Range.—Nuevo Leon, Mexico, and South Texas from Cameron, Hidalgo and Webb counties north to Calhoun, Wilson and, perhaps, Bexar counties.

Mexican localities.—Nuevo Leon (Brit. Mus. Nat. Hist.). No doubt this subspecies also occurs in northern Tamaulipas.

Taxonomic notes.—This well-characterized form is now considered a subspecies of *episcopa* on the basis of intermediate specimens from Hays and Travis counties, Texas. Also, the population of Bosque and McLennan counties, 100 miles to the north, is significantly lower in its counts than are any other known *episcopa* populations, but its counts are not as low as those of Hays and Travis counties specimens. This quite possibly indicates a trend in the direction of *taylori*. Thus, the available data suggest a north to south intergradation along the east face of the Balcones Escarpment in central Texas. There are no specimens to provide information as to the relationship of the races in south-central Texas along the southern arm of the Balcones Escarpment, and the condition in Nuevo Leon is not determinable from present data.

In general, *taylori* occurs in areas lower than 500 feet in altitude, whereas the records for *episcopa* indicate that it inhabits higher terrain.

Genus *Chionactis*.

The differences between *Sonora occipitalis* and the rest of the genus are of such variety and magnitude that generic segregation is necessary. The name *Chionactis* of Cope (1860) is available for *occipitalis*. The writer is averse to the generic separation of rather closely related species, particularly when one of the resultant genera is monotypic, but the dif-

ferences between *Chionactis* and *Sonora* are such that the retention of both groups in the same genus would be contrary to all ordinary standards of generic characterization. Deviations may be observed in all parts of the body, and only the major ones are listed in the tabulation that follows.

Sonora (and *Procinura*).

1. No nasal valve.
2. Abdomen rounded.
3. Snout normal, rounded.
4. 1, occasionally 2, maxillary foramina.
5. Maxillary teeth 11 + 3 to 13 + 3.
6. Sulcus terminating in a bare area between the lobes.
7. 3 to 14 small and medium sized spines on the plane of the large basal spines and below the zone of small spines.
8. Spines in upper part of zone of small spines not or but little enlarged just beneath the surface of the hemipenis.

Chionactis.

1. Nasal valve present.
2. Abdomen angled.
3. Snout flattened, spade-like.
4. 3 maxillary foramina.
5. Maxillary teeth 8 + 3 or 9 + 3.
6. End of sulcus surrounded by calyces, no bare area present at top of penis.
7. No spines below zone of small spines except the two large basal spines.
8. Spines in upper part of zone of small spines much enlarged just beneath the surface of the hemipenis.

Chionactis occipitalis annulatus (Baird).

Lamprosoma annulatum Baird, 1859, U. S. Mex. Bound. Surv., p. 22.

Type locality.—Colorado Desert.

Range.—Imperial Co. and eastern San Diego Co., California, and southwestern Arizona.

Mexican localities.—This snake has not yet been recorded from Mexico, but it undoubtedly occurs in both northern Baja California and northwestern Sonora.

Chionactis occipitalis palarostris (Klauber).

Sonora palarostris Klauber, 1937, Trans. San Diego Soc. Nat. Hist., vol. 8, p. 363–365.

Type locality.—Five miles south of Magdalena, Sonora (Klauber 26771).

Range.—Known only from the type locality and from Costa Rica Ranch (50 miles west of Hermosillo, Sonora) (Mus. Comp. Zool. 36890).

KEY TO THE SNAKES OF THE GENERA *Sonora* AND *Chionactis*.¹

- 1a Abdomen rounded; snout normal, rounded, not spade-like; no nasal valve; scale rows various (*Sonora*).....5

¹Where there is no gap between contrasted figures in this key it may be assumed that a separation was made between overlapping curves of variation. In arriving at each such point of separation the actual and theoretical dispersions for the character were carefully considered. The key should correctly identify about 85% to 90% of the specimens.

- 1b Abdomen angled; snout flattened, spade-like; a nasal valve present; scale rows 15-15 (*Chionactis*).....2
- 2a Total number of bands on body and tail plus the number of body bands not entirely encircling the body equals 52 or more; bands usually brown; interspaces without reddish saddles.....
C. occipitalis occipitalis
- 2b Total number of bands plus number of incomplete body bands equals 51 or fewer; bands usually black, widened on the abdomen; interspaces, at least in life, with ill-defined reddish saddles on light ground color (except in *C. o. klauberi*).....3
- 3a Total number of bands 22 or more.....4
- 3b Total number of bands 21 or fewer.....*C. occipitalis palarostris*
- 4a No definite, secondary, brown crossbands present between the primary dark bands, although there may be dark edging and speckling on the scales of the interspaces in occasional specimens.....*C. occipitalis annulatus*
- 4b Definite, secondary, brown crossbands present between the primary darker bands; pigmentation of the secondary bands arising at the bases of the scales rather than at their edges.....
C. occipitalis klauberi
- 5a Pattern either without crossbands or with one to many black crossbands on a variously pigmented ground color, but pattern neither based on nor including 3 different colors of crossbands; nasal usually entire, seldom sutured; color pattern without sexual variation; scale rows various (*Sonora semianulata* group).....8
- 5b Pattern tricolor, with black, grayish and reddish crossbands on body or tail or both, or the reddish may cover most of the body and tail, in which case black and grayish bands persist only on the nuchal region; nasal plates sutured below nostril in most specimens, but frequently entire; color pattern with marked sexual variation; scale rows 15-15 (*Sonora michoacanensis* group).....6
- 6a Tail reddish, unbanded.....*S. michoacanensis michoacanensis*
- 6b Tail with triads of black, grayish, and reddish bands.....7
- 7a Unsplit black bands much longer (anteroposteriorly) than grayish bands, or else all black bands split by red; at least some of the anterior body bands always split by red.....
S. michoacanensis mutabilis
- 7b Unsplit black bands approximately equal in length to the grayish bands; in the single known specimen (a female) none of the body bands is split by red.....*Sonora*, species
- 8a Anterior scale rows 15, rarely 14 or 16; temporals generally 1-2 (1-2 or higher on both sides in 96% of specimens).....9
- 8b Scale rows 13-13, rarely 14-13 or 14-14; temporals generally 1-1 (1-1 on one or both sides in 87% of specimens); color brownish, unbanded; ventrals of males 126 to 142, of females 136 to 151.....*S. episcopa taylori*

- 9a Caudals 53 or more in males, 45 or more in females; scale rows 15-14 (posterior scale rows counted in reference to scale row reduction in the middorsal region, disregarding lateral irregularities).....10
- 9b Caudals 52 or fewer in males, 44 or fewer in females; scale rows various.....13
- 10a Ventrals minus caudals 97 or fewer in males, 115 or fewer in females; tail 23% to 25.2% of total length in males, 20.3% to 21.6% in females (in preserved specimens); known only from Chihuahua and the Big Bend region of Texas.....
S. semiannulata blanchardi
- 10b Ventrals minus caudals 98 or more in males, 116 or more in females; tail 19.4% to 23.3% of total length in males, 16.4% to 20.0% in females.....11
- 11a Pattern of crossbands, with most of the body bands entirely crossing the abdomen; known only from the Grand Canyon of the Colorado River, Arizona.....*S. semiannulata gloydii*
- 11b With or without crossbands, but if banded, few or none of the body bands cross the abdomen.....12
- 12a Without crossbands, but with a distinct, rather sharp-edged dorsal reddish stripe that contrasts in color with the bluish-gray to brownish-gray sides; known only from southeastern California and adjacent Baja California.....*S. semiannulata linearis*
- 12b With or without crossbands, but if bands are lacking the color of the back is the same as, or changes gradually into, the gray, reddish, or brown of the sides.....*S. semiannulata isozona*
- 13a Ventrals plus caudals 202 or fewer in males, 206 or fewer in females.....14
- 13b Ventrals plus caudals 203 or more in males, 207 or more in females.....Return to 11
- 14a Ventrals minus caudals in males generally more than 109, in females presumably averaging over 127 (no females known); scale rows 15-14; pattern consisting of dark crossbands; known only from the vicinity of the Santa Rita Mountains of Arizona.....
S. semiannulata semiannulata
- 14b Ventrals minus caudals in males generally less than 109, in females generally less than 127; scale rows and color as above or otherwise.....15
- 15a Scale rows typically 15-15, occasionally 15-14; ventrals plus caudals in males 195 or less in 82% of specimens (av. 191.1), in females 200 or less in 92% of specimens (av. 194.4); color highly variable (but often brown and unbanded); a species of the Great Plains.....*S. episcopa episcopa*
- 15b Scale rows 15-14-13 in the four known males and 15-14 in the single known female; ventrals plus caudals in three males 196 to 200 (av. 198.6), in the female 203; color unbanded, all brown; known only from the vicinity of Comondú, Baja California.....*S. mosaueri*

Acknowledgments.—Dr. Edward H. Taylor and Dr. Hobart M. Smith have very kindly permitted me to study and describe specimens in their private collection and have supplied many pieces of information. Dr. Smith also furnished the description of the specimen in the Dugès Museo and criticized the manuscript. Dr. Emmett R. Dunn took additional data on the type of *Procinura aemula* and provided the results of his analysis of the perplexing Richardson collections. Mr. H. W. Parker sent me much valuable data on the specimens in the British Museum. Information on the specimens in the Muséum National d'Histoire Naturelle was obtained through the courtesy of M. F. Angel. For the loan of specimens with which this paper is particularly concerned I am indebted to Dr. Leonhard Stejneger and Dr. Doris M. Cochran of the U. S. National Museum, Mr. Charles M. Bogert of the American Museum of Natural History, Mr. Arthur Loveridge of the Museum of Comparative Zoology, Mr. Clifford H. Pope and Mr. Karl P. Schmidt of the Field Museum, Mr. E. B. Shelley Logier of the Royal Ontario Museum of Zoology, Mr. Francis M. Uhler of the U. S. Fish and Wildlife Service, and to Mrs. Helen T. Gaige and Dr. Norman Hartweg of the University of Michigan. Dr. Carl L. Hubbs criticized the manuscript and made several valuable suggestions. To each of these individuals I wish to express my sincere appreciation.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

REVISION OF THE RORULENTA GROUP OF THE
SCARAB BEETLE GENUS PHYLLOPHAGA.

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Throughout Central America, several species of the *P. rorulenta* (Burmeister) complex are locally and individually common; nearly every collection of material received by the writer for determination during the past ten years has included at least several specimens of this group. It is still practically impossible to determine the nine species so far described due to the variation in dorsal pilosity and color, as well as to the lack of really good distinguishing external characters among the species. With the thought in mind of alleviating this condition, I have accumulated all available material in the complex and have presented additional characters of importance in separating the species, including the introduction of male genital characters.

I have been fortunate in having the cooperation of Mr. G. J. Arrow of the British Museum, and Mr. R. Paulian of the Paris Museum, and through their kindness have been permitted to view and dissect certain type specimens of Bates and Blanchard; I have also obtained specimens of Moser's species through Dr. F. Ohaus of Berlin. I am also indebted to Dr. Howard Hinton, now of the British Museum, who compared certain specimens with the types for me.

The *rorulenta* group of the genus *Phyllophaga* includes 13 species as known to me, of which 5 are described as new in the present paper. The group is characterized by (males): Robust-oval, medium sized species (16-22 mm.), most of which are semipruinose or distinctly pruinose dorsally. The best group characters are: the convex abdomen, very short, transversely-impressed 6th abdominal sternite and the short, fixed, hind tibial spur (usually only $\frac{1}{4}$ as long as the free spur, or even shorter; rarely apparently lacking entirely, and in a few cases becoming

nearly $1/3$ as long as the free spur; in most cases the fixed spur is broad at base, suddenly narrowed to apex and slightly twisted). Antennal club 10-segmented, the club usually small and ovate and usually a little shorter than the funicle. Known only from the extreme Southern part of the United States (Texas), all Central America and the northern rim of northern South America (Columbia, Venezuela and Trinidad).

The known females of this complex are rather hard to separate; the pygidial characters appear the best if room for slight variation is taken into account. The females of the seven species known to me may be separated fairly well by the following key:

1. Pygidium strongly convex, the apical third with a deep, very narrow and longitudinal sulcus, the surface either side of this quite tumid, the disc moderately densely, somewhat coarsely punctate; thorax and elytra with hairs absent or so minute as to be hardly discernible, without long, erect hairs near elytral suture. Costa Rica to Panama.....*chiriquina* (Bates)
- Pygidium flat to convex, never exactly as above, if tumid then the tumosities well separated.....2.
2. Pygidium highly polished, apical half deeply concave, each side of concavity with a strongly raised, longitudinal tumosity, the depressed area between the latter impunctate or nearly so; dorsal surface highly polished and not at all pruinose, the thorax and head nude or apparently so, hairs if present very minute and no long hairs on elytra. Mexico & Guatemala.....*cinnamomea* (B1.)
- Pygidial characters not as above; dorsal surface usually at least partly pruinose.....3.
3. Pygidium noticeably flattened in apical half, disc at middle neither tumid nor depressed; apical third of disc faintly tumid right at the side margin only. Elytra with very long hairs near suture and apex.....4.
- Pygidium less flat, or the disc either bitumid or bimammilate, but if bitumid the disc usually coarsely punctate at middle. Elytral hairs lacking, or if present of only moderate length.....5.
4. Dorsal hairs small but obvious under moderate magnification, apical half of pygidium at least *sparsely punctate*; scutellum obviously punctate; center disc of thorax with scattered, rather coarse punctures. Mexico.....*parvisetis* (Bates)
- Dorsal short hairs lacking or hardly obvious, the long, sparse elytral hairs well developed; apical half of pygidium *very smooth*, polished, and *impunctate* or at most with one or two fine punctures near edge of disc; scutellum usually impunctate or at most with several fine punctures laterally; center disc of thorax much less densely punctate. C. Rica to Panama.....*vicina* (Moser)
5. Pygidium somewhat flattened, with a very small tumosity in apical fourth, the tumosities fairly near sides and widely separated, the surface between coarsely punctate; above with

minute hairs on elytra or glabrous, at times with a few short erect hairs near elytral suture; above castaneopiceous, and deeply pruinose (Size 20–21 mm.) Texas to Northern Mexico....

temora, new species

Pygidium convex and bitumose, often markedly so; above glabrous or hairy; coloration of elytra usually rufotestaceous. (Size 17–19 mm.). Southern Mexico to Panama.....6.

6. Apical third of pygidium strongly bimammillate, each tumosity well separated by a moderately deep, impunctate concavity; elytra with minute hair and sparse, much longer hairs, elytral carina weak or lacking. (C. Rica.).....*hondura*, new species

Pygidium polished, convex, longitudinally and shallowly foveate in apical third, surface each side evenly rounded but not tumid, disc moderately densely punctate, disc of concavity impunctate or nearly so; above nude or nearly so, without long elytral hairs; elytral striae well indicated. (Mexico to Columbia).....*rorulenta* (Bu.)

The males are best separated by reference to the excellent genital characters and the reader is referred to the figures of such. Due to considerable variation in the external characters as well as to the great degree of similarity between the species, I have been unable to construct a satisfactory male key based on the present materials. All male specimens should be dissected to properly place them.

Phyllophaga (Phyllophaga) rorulenta (Burmeister).

(Plate IV, Fig. 10; Plate V, Fig. 3; Plate VI, Fig. 12.)

Ancylonycha rorulenta Burmeister, Hand. Ent. I, IV (2), p. 331.

Lachnosterna rorulenta Bu., Bates, Biol. Cent. Amer., II (2): 196; 1. c.,: 403.

Lachnosterna trinitatis Arrow, 1900, Trans. Amer. Ent. Soc.,: 182.

Male.—Oblong-oval, but very slightly wider behind; color castaneous to rufocastaneous, the thorax and head usually rufous and at least subshining (rarely the thorax subpruinose), the elytra pruinose. Head broad, the front convex, polished, with somewhat coarse, moderately dense punctures and a few erect hairs. Clypeal suture bicarinate, not impressed. Clypeus broad and moderately long, the angles very broadly rounded and thus hardly indicated, the lateral margins not reflexed, the apex slightly reflexed and very narrowly subemarginate at middle; disc flat and with moderately dense punctures rather regularly placed, each separated by once or more its diameter. Antenna 10-segmented; club small and ovate, equal only to segments 3–7 combined. Thorax with sides dilated at middle and often crenate-ciliate in apical half; disc with small, sparse punctures separated by 2–4 times their diameters and each bearing an extremely minute (hardly obvious) erect hair, the disc frequently with an irregular, median impunctate area. Scutellum finely and very sparsely punctate, with minute hairs. Elytra with sparse, moderately-small punctures separated by 2–4 times their diameters.

ters and with erect minute hairs (rarely these a little longer); disc near suture and scutellum rarely with a very few short hairs; striae other than sutural present but not prominent. Pygidium polished or subpruinose, the disc slightly and evenly convex, with the sparse, irregularly placed punctures separated by 1-3 times their diameters and with extremely minute erect hairs; apical margin thickened, ciliate, and narrowly subrounded. Abdomen slightly but evenly convex, the surface shining or subpruinose and with fine, very sparse punctures and minute suberect hairs; 5th sternite transversely impressed apically, the disc with several dozen transverse punctures; 6th sternite less than half as long as 5th, transversely impressed and rather densely punctate, the basal and apical margins faintly carinate and the latter ciliate. Hind spurs with one fixed, short and scarcely curved; free spur nearly three times (rarely only twice) longer and graceful; first segment of hind tarsus shorter than second. Claws short, with the long, submedian tooth slightly longer than apical tooth and the claw base obviously but very obtusely dilated. Front tarsi normal, with small but obvious spines on inner apex of each segment.

Female.—Antennal club equal to segments 4-7 combined. Pygidium as in male except the apical 2/5 is strongly tumid each side of the middle and the surface between is widely and moderately deeply concave, and somewhat rugose. Fifth sternite plane, slightly impressed; 6th half as long as 5th, slightly convex and coarsely punctate, with erect hairs. Hind spurs freely, and of nearly same length. First segment of hind tarsus much shorter than the second. Basal dilation of claws less obvious. Otherwise as in the male. Length, 16-22 mm. Width, 8-11 mm.

This species is quite common and rather widespread. I have specimens from Mexico, Panama, Barro Colorado Island in the Canal Zone, Venezuela (Merida is the type locality), Colombia, Trinidad and British Guiana. It occurs commonly at light from March through August; also recorded from Guatemala and Costa Rica by Bates. I have specimens of *trinitatis* Arrow from Trinidad and several localities in British Guiana (June to October); these are slightly larger than average *rorulenta*, and somewhat darker, but all other characters including genitalia are exactly similar and they appear to be well within the range of variation of *rorulenta*.

Phyllophaga (Phyllophaga) hondura, new species.

Plate IV, Fig. 7; Plate V, Fig. 10; Plate VI, Fig. 4.)

Male.—Similar to *rorulenta* Burm. except as follows: Thoracic hairs are small but obvious and there is no central, impunctate area on the disc; the elytral hairs are minute but obvious, the striae are neither well-marked nor obvious and the elytral base is set with a few long, erect hairs; the pygidial hairs are minute but obvious; the abdominal punctures are denser, and the genitalia are quite different.

Female.—Same as male except: Antennal club equal to segments 4-7 combined. Pygidium polished, the disc with a strong tumosity at each

side in apical 2/5, the surface between widely concave (and slightly rugose and impunctate), and faintly, longitudinally impressed; disc with coarse and sparse punctures, and minute hairs. Elytral disc near suture with about two dozen very long hairs each set in a large puncture. Fifth sternite not transversely impressed apically. Length 17–19 mm.

The male *Holotype* and female *Allotype* in the Saylor Collection are a pair from: "Province of Santa Clara, Costa Rica, April"; a male paratype is also at hand from "M-tee Dist. of British Honduras, June." This species is closely allied to *spaethi* (Nonfried) in male genitalic form but in en-face view the apices of the lateral lobes are very broad (as broad as the entire width of the combined lobes) and the apex is straight and truncate, whereas in *spaethi* the lobe in enface view are much narrower apically and each lobe apex is distinctly rounded; the two species are nearly similar in lateral views of the male genitalia but quite different when the genitalia are viewed dorsally (much wider and not at all sub-parallel-sided in *spaethi*).

Phyllophaga (Phyllophaga) spaethi (Nonfried).

(Plate IV, Fig. 4; Plate V, Fig. 5.)

Lachnosterna spaethi Nonfried, Deut. Ent. Zeit., 1891, p. 265.

(Plate IV, Fig. 4; Plate V, Fig. 5; *Lachnosterna spaethi* Nonfried, Deut. Ent. Zeit., 1891, p. 265.)

Male.—Characters much as in *rorulenta*, except: Color rufo- to priceo-castaneous, hardly pruinose except slightly on elytra. Punctures of front and prothorax coarse and rather close, those at sides of thorax separated by once or less their diameters and many of those on front and vertex of the head nearly contiguous. Elytra and thorax with minute but obvious hairs. Elytra noticeably rugose, especially near sides. Front tarsi with small spines at inner apices of each segment. Length 21. mm. Width 11. mm.

Nonfried described the species from "Honduras," and his descriptions in this genus and others are all so poor that it is hardly possible to differentiate between closely allied species. I have been unable to locate his type and thus to facilitate identification I am designating a specimen in the Saylor Collection as a *Neoholotype*: it is a male from "San Jose, Costa Rica." A second specimen in the Saylor Collection is from "San Pedro Sula, Honduras, determined by Moser"; it was determined by Moser as *spaethi* (?),—it is smaller (18.5 mm.) and the elytral hair and rugosity are much less developed, but the genitalia are apparently those of this species. The species was evidently overlooked by Bates as he does not mention it in the *Biologia*.

Phyllophaga (Phyllophaga) baneta, new species.

(Plate IV, Fig. 6; Plate V, Fig. 6; Plate VI, Fig. 5.)

Male.—Similar to *rorulenta* except as follows: Size slightly larger. Color somewhat similar but the elytra less pruinose, and more testaceo-

castaneous, the head, thorax and legs nearly piceorufous. Scutellum punctate only at sides. Entire lateral margin of thorax crenate. Genitalia quite different. Length 23 mm. Width 11.5 mm.

The *Holotype* male in the Saylor Collection is from "Sabaneta, Ra Roja, Guatemala": a paratype male from "Lancetilla, Honduras, May," is slightly darker than the holotype, and the thorax is piceocastaneous in color. While very close to *spaethi*, in general genitalic form. I believe it best to separate the two because of several characters: in enface view of the male genitalia the apices of the lateral lobes of *spaethi* are more rounded and less reflexed than in *baneta*. The external differences are: in *spaethi* the median tarsal claw is no longer than the apical one and is hardly at all inclined basally, whereas in the present species the median claw tooth is very distinctly larger than the apical one and is very definitely and basally inclined; the puncturation of the front and thorax of *spaethi* is much coarser and denser, the elytra are more coarsely punctate and rugose, and the coloration is much darker.

Phyllophaga (Phyllophaga) caraga, new species.

(Plate IV, Fig. 5; Plate V, Fig. 1.)

Male.—Similar in all respects to *rorulenta* except as follows: Color castaneorufous, the elytra subpruinose. Thorax apparently entirely glabrous on disc (very minute hairs visible only under high magnification). Elytra with extremely minute, hardly-obvious hairs, and without any longer hairs in the sutural-basal area. Pygidium convex, and apparently glabrous. Transverse punctures of 5th sternite much more dense. Genitalia quite different. Length 21.5 mm. Width 11 mm.

The unique male *Holotype* in the Saylor Collection is from "Nicaragua."

Phyllophaga (Phyllophaga) parvisetis (Bates).

(Plate IV, Fig. 3; Plate V, Fig. 11; Plate VI, Fig. 3.)

Lacknosterna parvisetis Bates, 1888, Biol. Cent. Amer. II (2): 196; 1. c. p. 403.

Male.—Differs from *rorulenta* only in possessing small but quite obvious hairs on the thorax and elytra, and in the genitalic form. *Female*: Same as female *rorulenta* except: elytra and thorax with short but obvious hairs and the elytra also with very long hairs especially at base, apex and along suture; pygidium with the lateral wheals very widely separated, much more apical in position and less raised than in *rorulenta* (in fact exactly as in female *vicina* and externally hardly separable from the latter species). Length 20–25 mm. Width 9–11 mm.

The species was described from Teapa and Cordova in Mexico. I have specimens compared with the types by Mr. Arrow and also additional topotype material from Cordova collected in May; also 2 males from "Chiapas, Mexico, Pacific Slope of Cordilleras, 800–1000 M. L. Holzen, 1919," and a male from "Escuintla, 1931." An additional apir from "Tehuantepec, Cax., Mexico, VI-30," I leave here as *parvisetis*

var.: the male genitalia in enface view and in lateral view is a little less wide but otherwise appears to be this species. *P. parvisetis* appears closest to *vicina* in most characters, but the male genitalia, slightly more obvious elytral and thoracic hair, and more densely punctured pygidial apex, will readily separate them (apical 1/3 male pygidium in *vicina* is relatively smooth and nearly impunctate).

***Phyllophaga (Phyllophaga) acapulca*, new species.**

(Plate IV, Fig. 9; Plate V, Fig. 7; Plate VI, Fig. 1.)

Male.—Similar in most respects to *rorulenta*, differing mostly as follows: Color castaneopiceous on head, thorax and elytral bases, the remainder of the elytra rufocastaneous. Form robust-oval, wider behind. Thoracic and elytral hairs so minute as to be obvious only under high magnification. Elytral surface somewhat rugose. Pygidium more convex. Genitalia quite different. Length 21.5 mm. Width 12.3 mm.

The unique male *Holotype* from "Acapulco, Mexico, July," remains in the Saylor Collection.

***Phyllophaga (Phyllophaga) temora*, new species.**

(Plate IV, Fig. 1; Plate V, Fig. 9; Plate VI, Fig. 8.)

Male.—Similar to *rorulenta* in most respects, differing mostly as follows: Dorsal hairs slightly more obvious. Elytra striae less obvious. Thoracic base nearly completely margined by a row of coarse punctures. Inner spur of front tarsal segments more obvious. Genitalia different.

Female.—Differs from male as follows: Antennal club equal to segments 3–7 combined. Pygidium faintly tumid each side near apex, the area between coarsely punctate and shallowly concave, remainder of disc coarsely and sparsely punctate; 5th sternite almost as in male; 6th sternite convex, coarsely and densely punctate, with erect hairs. Hind spurs free, first segment of hind tarsus distinctly shorter than second. Length 17–19.5 mm. Width 9.5 m.–10.5 mm.

The *Holotype* male and *Allotype* female are from "Montemorelos, Nuevo Leon, Mexico, 1400 ft. elevation, at light, May 20, 1937, Al Meade Collector." Ten paratypes (4 of these are males) are from the same locality (4 specimens); also from "Del Rio, Texas, May, Al Meade (5 specimens)," and "Monterey, Mexico, June 3, 1935" (1). All specimens remain in the Saylor Collection. Though closely related to *temaxa* Saylor, the sparser thoracic and elytral puncturation, as well as the male genitalic characters of the present species will readily separate them.

***Phyllophaga (Phyllophaga) temaxa* Saylor.**

(Plate IV, Fig. 2; Plate VI, Fig. 2.)

Phyllophaga (Phyllophaga) temaxa Saylor, 1940, Jr. Wash. Acad. Sci., 30: 314.

Lachnosterna parilis Bates, 1889, Biol. Cent. Amer. II (2), p. 404 (non *Listrochelus parilis* Bates, l. c., p. 172).

Male: Similar to *rorulenta* in most essential characters: the dorsal surface is more closely punctate, slightly pruinose, and glabrous and the size larger; the genitalia are more as in *elenans* Saylor. Length, 22–26 mm.

The type locality is "Temas in North Yucatan" and the species normally averages 23–25 mm., though I have seen one specimen apparently of this species, from Guatemala, and it is slightly less densely punctate and a little smaller (20 mm.). I have examined a male *Cotype* from the British Museum through the courtesy of Mr. Arrow. The male genitalia of *temaxa*, in enface view, differ from *elenans* Saylor especially in the pearshaped internal opening (rather than round) and the less-rounded apex.

Phyllophaga (Phyllophaga) elenans Saylor.

(Plate IV, Fig. 3; Plate VI, Fig. 6.)

Phyllophaga (Phyllophaga) elenans Saylor, 1938, Proc. Biol. Soc. Wash., 51: 190.

Male.—Differs from *rorulenta* especially in the hind tibial spurs (the fixed spur is long and narrow, about $\frac{3}{4}$ as long as the free spur and straight, not unciform); dorsal surface usually shining, the head and thorax rufous, with a faint pruinose elytral sheen; thorax with short but fairly prominent, suberect hair; elytra with short erect hairs and longer hairs near base and suture; genitalia quite different in form. Length 17 mm.

Known only from the unique male type from "Santa Elena, Guanacaste, Costa Rica, Tassman Collector, June 1924," and now in the Ferd Nevermann Collection in the U. S. N. M. The well-rounded, apex (enface view) of the lateral lobes of the male genitalia is different from any other species in the complex.

Phyllophaga (Phyllophaga) vicina (Moser).

(Plate IV, Fig. 10; Plate V, Fig. 8; Plate VI, Fig. 11.)

Lachnosterna vicina Moser, 1918, Stett. Ent. Zeit., 79:29.

Male.—Hind fixed spur short, distinctly curved, and about $\frac{1}{3}$ or $\frac{1}{4}$ (rarely $\frac{1}{6}$) as long as the free spur. Pygidium slightly convex, polished, the disc *very sparsely* punctate at middle, with a few minute hairs, the apex ciliate; in many specimens the apical $\frac{3}{5}$ of the disc is *entirely* impunctate. Thorax and elytra with minute, hardly visible hair, and at times a few short and erect hairs near the elytral base and suture. Head with long erect hairs on front. Otherwise as in *rorulenta*.

Female.—Upper claw tooth long and strongly reflexed basally (more so than in *rorulenta*). Thorax with very short hairs. Elytra with minute hairs and also several dozen very long and erect hairs near elytral suture, and especially near the apex. Pygidium nearly flat, polished, the disc *slightly* tumid, each side *at the side* and in the apical fourth, the wide

space between the two slight tumosities flat and impunctate (rarely with several punctures),—the basal portion of disc very sparsely and finely punctate and with minute hairs. Otherwise as in female *rorulenta*. Length 17–21 mm. Width 10–12 mm.

Described from Costa Rica. I have the species from "San Jose, Costa Rica, 800 M, Nevermann," and "Madden Dam, Canal Zone, Panama, V-18-36, M. M. Saylor Collector." Two of the Madden Dam females are much more hairy than usual and the entire elytra possesses the long and erect hairs; a male from this locality is similarly decorated, though the hairs are shorter and the usual male vestiture is very short and scarcely obvious. The male genitalia are very distinctive in lateral view and readily place the species. The long elytral hairs are also distinctive of the female. Apparently commonly attracted to lights, as are nearly all other members of the genus.

Phyllophaga (Phyllophaga) chiriquina (Bates).

(Plate IV, Fig. 13; Plate V, Fig. 2; Plate VI, Fig. 9.)

Lachnosterna chiriquina Bates, 1888, Biol. Cent. Amer., II (2), p. 196.

Male.—Closely allied to *rorulenta*, differing mainly as follows: Hind tibial fixed spur *very small* and in some few cases hardly indicated, at most about $1/6$ to $1/10$ the length of the long free spur. Vestiture of thorax and elytra very minute and only obvious under high magnification. Pygidium convex, wrinkled, the moderately dense punctures with minute hairs, the apical third of disc impunctate, genitalia of quite different form from any other in the complex.

Female.—Differs from female *rorulenta* mainly as follows: Pygidium strongly convex, the apical half feebly and very narrowly impressed longitudinally and each side of this narrow sulcus strongly elevated, so that the disc is bimammilate; entire disc coarsely and finely closely punctate, with minute hairs. Vestiture of thorax and elytra extremely minute and not obvious. Length 17–19 mm. Width 10–11 mm.

This is one of the most distinctive and easily determinable species of the group since the external features (male short fixed spur and female pygidium) and the male genitalia are quite different from any others in the group. *P. chiriquina* was described from Volcan de Chiriqui in Panama. I have specimens from "Poterillos, Panama, Vincent Brown Collector," "Nicaragua," "San Carlos, Costa Rica," "Mexico" (?error?), "Barro Colorado Island, Canal Zone, III-4-37, S. W. Frost Collector," and "Vergara, Columbia, October". In three of the series of twenty-odd males from Poterillos before me there is no trace of the short, fixed hind spur, whereas in the others the spur is present though very short, and in one other specimen the spur is nearly $1/5$ the length of the free spur. In the single Costa Rican male example at hand the fixed spur is nearly $1/4$ as long as the other but all other characters including male genitalia are typical of *chiriquina*.

Phyllophaga (Phyllophaga) cinnamomea (Blanchard).

(Plate IV, Fig. 12; Plate V, Fig. 4; Plate VI, Fig. 7.)

Ancylonycha cinnamomea Blanchard 1850, Cat. Col. I, p. 134.

Lachnosclerna cinnamomea Bl., Bates 1888, Biol. Cent. Amer., II (2), p. 197.

Male.—Similar in nearly all respects to *rorulenta*, differing mainly as follows: Color strongly shining, at most the elytra very faintly pruinose; the thorax, elytra and pygidium glabrous or apparently so; size slightly larger usually, in enface view the genitalia are noticeably broadened apically, and the lateral lobes are slightly reflexed, whereas in *rorulenta* the sides are nearly subparallel and the apical teeth are much less acute and not all reflexed,—the genitalia of both species differ somewhat in their lateral and dorsal views.

Female.—Much as in female *rorulenta* except: Dorsal surface highly polished and not at all pruinose, and nude above; pygidium with discal area polished and apically with two very long, high and acute ridges each side of the rather deep central concavity, the basal half of disc very sparsely punctate, polished, and nude. Length 19–21. Width 10–12 mm.

I have examined a female *Cotype* from "Mexico, Geisbrecht 1842" very kindly loaned from the Blanchard Collection in the Paris Museum through Messrs Lesne and Paulian, and a British Museum male specimen from "Cordova, Salle," kindly loaned by Mr. Arrow. I have a male specimen from "Mexico, Muller, Collection of Metzler." Of 3 females from "Cordoba, Mexico May" two have the characteristic, deeply-foveate pygidium while the third possesses the same character but is much less deeply concave so that the character is apparently slightly variable. Four additional males and two females, from "Cocoa, Alta Vera Paz, Guatemala, III-24-1906, collected by Barber and Schwarz (U. S. N. M.)," and from "Guatemala," I leave here for the present: the males seem identical in all respects to the Cordova male, but are slightly smaller (18 mm.) and faintly pruinose and the genitalia are slightly different; the two females however do not match the cotype female at all, as the pygidium is flat and the two lateral ridges are represented by faint wheals exactly as in a female *vicina*, but these differ from the latter in the nude and shining normal surface. Thus I leave these 6 specimens here with reserve. The strongly polished exterior of the typical examples, especially the three Cordova females, is very striking and superficially reminds one of a robust *Phytalus obsoletus* (Blanchard).

EXPLANATION OF PLATES.

PLATE IV.

- Fig. 1. *P. temora* Saylor.
 2. *P. temaxa* Saylor.
 3. *P. elenans* Saylor.
 4. *P. spaethi* (Nonf.).
 5. *P. caraga* Saylor.
 6. *P. baneta* Saylor.
 7. *P. hondura* Saylor.
 8. *P. parvisetis* (Bates).
 9. *P. acapulca* Saylor.
 10. *P. vicina* (Mos.).
 11. *P. rorulenta* (Burm.).
 12. *P. cinnamomea* (Blanch.).
 13. *P. chiriquina* (Bates).

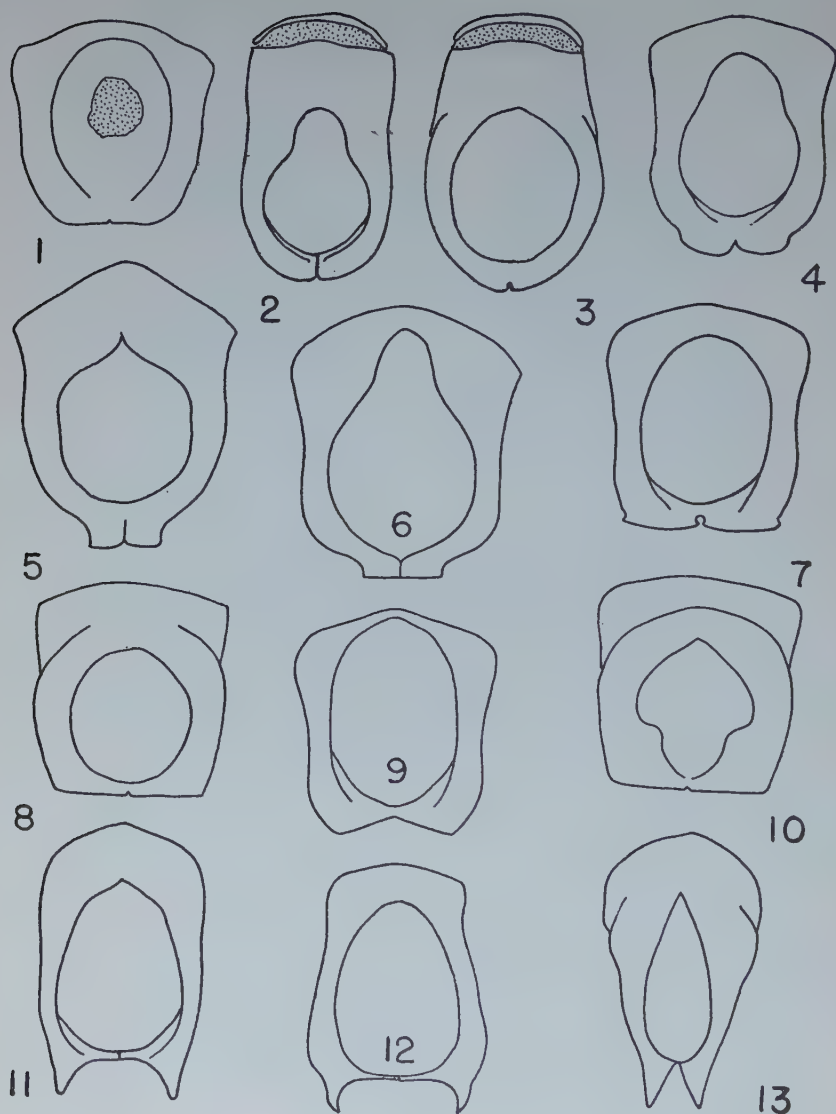
PLATE V.

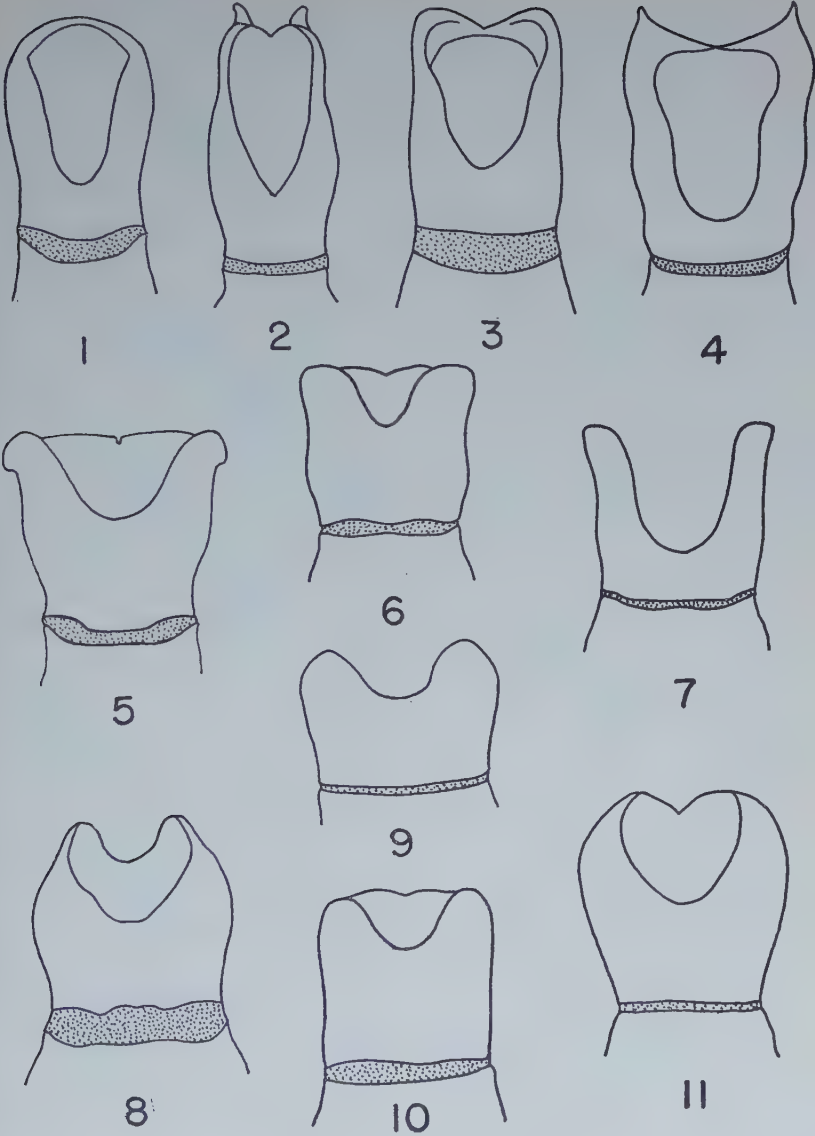
- Fig. 1. *P. caraga* Saylor.
 2. *P. chiriquina* (Bates).
 3. *P. rorulenta* (Burm.).
 4. *P. cinnamomea* (Blanch.).

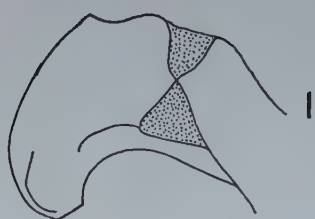
- Fig. 5. *P. spaethi* (Nonf.).
 6. *P. baneta* Saylor.
 7. *P. acapulca* Saylor.
 8. *P. vicina* (Moser).
 9. *P. temora* Saylor.
 10. *P. hondura* Saylor.
 11. *P. parvisetis* (Bates).

PLATE VI.

- Fig. 1. *P. acapulca* Saylor.
 2. *P. temaxa* Saylor.
 3. *P. parvisetis* (Bates).
 4. *P. hondura* Saylor.
 5. *P. baneta* Saylor.
 6. *P. elenans* Saylor.
 7. *P. cinnamomea* (Blanch.).
 8. *P. temora* Saylor.
 9. *P. chiriquina* (Bates).
 10. *P. caraga* Saylor.
 11. *P. vicina* (Moser).
 12. *P. rorulenta* (Burm.).

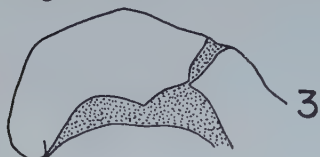
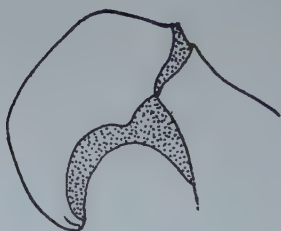






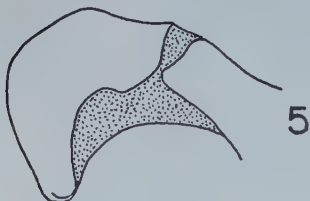
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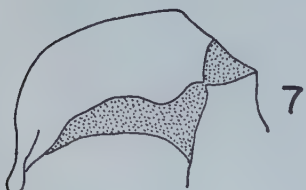
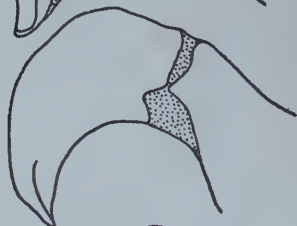
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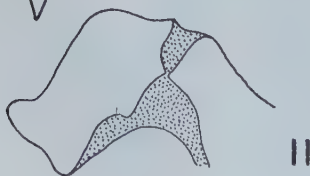
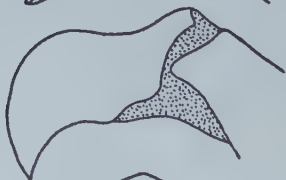
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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

SOME RECORDS AND DESCRIPTIONS OF
AMERICAN DIPLOPODS.

BY RALPH V. CHAMBERLIN.

The millipeds here recorded, unless otherwise stated in connection with the notes on the species concerned, were collected by Stanley and Dorothea Mulaik, mostly during the summer of 1941. All specimens, including the types, are at present retained in the author's collection at the University of Utah.

POLYXENIDAE.

Polyxenus fasciculatus Say.

Locality.—Texas: Val Verde County, Lantry, June 3, 1941. One specimen referred to this species.

SPHAEROTRICHOPIDAE.

Scytonotus amandus Chamberlin.

Locality.—Idaho: 7 miles north of Georgetown, August 23, 1941. Numerous males and females. The species was previously known from the Canyons of Salt Lake and Utah Counties in Utah.

XYSTODESMIDAE.

Rhysodesmus texicolens (Chamberlin).

Aporiaria texicolens Chamberlin, Proc. Biol. Soc. Wash., 1938, vol. 51, p. 207.

Localities.—Texas: Hidalgo County, Edinburg, June 7, 1941, one male, and San Juan, June 5, one female.

Genus **BORARIA**, new.

Further study of the species described by the author as *Aporiaria texicolens* indicates that this form belongs undoubtedly to the dominant Mexican and Central American genus *Rhysodesmus*. Since *texicolens* was named as the type of *Aporiaria*, the group of other North American species described under that genus is left without a generic name. For

it the name *Boraria* is here proposed, the character most readily distinguishing the group it designated being the apically slender non-furcate or non-toothed telopodite of the male gonopod.

Genotype.—*Boraria carolina* (Chamberlin).

***Sigmoria houstoni*, new species.**

Fig. 1.

In the preserved type, in which the colors probably have somewhat faded, the keels are a slightly orange yellow and the posterior border of metazonite a somewhat lighter yellow; the remaining portion of metazonite and posterior portion of prozonite brown, the brown area being lighter posteriorly; anterior portion of prozonite yellow. Antennae yellowish brown, the color darker distally. Legs yellow.

Quite distinct from related forms, such as *S. conclusa*, in the form of the gonopods of the male, especially in the details of the distal end of the telopodite and the lamellate basal spur. (See fig. 1).

Length of male holotype, about 39 mm.; width, 8.8 mm.

Locality.—Texas: Harris County, Houston, September-December, 1941, male holotype and female allotype, Russell Scott, collector.

***Nannaria ursa* Chamberlin.**

Figs. 2 and 3.

Localities.—New Mexico: North of Glencoe, May 31, 1941, many specimens; south of Fort Stanton, same date, about a dozen specimens; and west of Ruidosa, June 1, five specimens.

Originally described from Bear Canyon (Camp Mary White) in the same state.

CONOTYLIDAE.

***Conotyla coloradensis* Chamberlin.**

Localities.—Colorado: Douglas County, 20 miles southwest of Sedalia, August 6, 1941, two specimens; Larimer County, 7 miles west of Home, el. 8500 feet, August 7, 1941, six females; Jackson County, Cameron Pass, el. 10,000 feet, August 8, 1941, one male.

New Mexico: West of Ruidosa Junction, June 1, 1941, two specimens probably this species.

Wyoming: Woods Landing, el. 8000 feet, August 8, 1941, a male and female.

***Conotyla deseretae* Chamberlin.**

Localities.—Utah: Salt Lake County, Mill Creek Canyon, March 15, 1943, ten specimens of both sexes; Utah County, American Fork Canyon, above Aspen Grove, one female.

RHISCOSOMIDIDAE.

***Tingupa utahensis* Chamberlin.**

Locality.—Utah: Salt Lake County, Mill Creek Canyon, March 15, 1943, two females. The species was originally described from this same canyon.

LYSIOPETALIDAE.

Spirostrephon lactarium (Say)

Locality.—Texas: Harris County, Houston, September-December, 1941, several specimens, male and female, taken by Russell Scott.

This species seems to be much less common in Texas than *S. texense*.

NEMASOMIDAE.

Nopoiulus minutus (Brandt).

Localities.—Utah: Salt Lake City, April, 1942, numerous specimens.
Wyoming: Natrona County, Casper, August 10, 1941, one specimen.

Genus, *UTOIULUS*, new.

Gonopods of male elongate. Coxal piece of anterior pair of gonopods much exceeding the telopodite; sternite short; each provided with a long flagellum. Posterior gonopods with coxal division excavated on mesal side and telopodite channelled for reception of flagellum. First legs of male 6-jointed, thickened and without inner processes; second legs not obviously modified. Sternites free.

Genotype.—*Utoiulus utus* (Chamberlin).

Differing from *Nemasoma*, etc., in having the telopodite of posterior gonopods channelled for reception of flagellum, and in lacking processes from tibia or tarsus of first legs in the male.

Utoiulus utus (Chamberlin).

Nemasoma uta Chamberlin, Fig. 4 and 5 Ann. Ent. Soc. America, 5, 1912. p. 162.

Nec *Nannolene uta* Chamberlin, Pan-Pacific Ent., 2, 1925, p. 61.

General color brown, with repugnatorial glands showing as a series of black spots along each side, below which the sides are commonly paler than above. Antennae brown, the legs commonly paler.

Antennae conspicuously clavate. Eyes well developed with ocelli in 4 or 5 series; e.g., 7, 6, 4, 3.

Collum angularly narrowed down each side, with anterior margin of wing a little concave and the posterior convex.

Ordinary segments of body constricted about middle, giving the body a somewhat moniliform appearance; smooth above and striate below on each side.

Last tergite ecaudate, exceeded a little by the anal valves.

Gonopods of male as described for genus and illustrated in fig. 4.

First legs of male as shown in Fig. 5.

Number of segments, up to 48.

Length, to 12 mm.

Locality.—Utah: Mill Creek Canyon, March 15, 1943, numerous specimens.

PARAIULIDAE.

Aniulus oreines Chamberlin.

Utah: Salt Lake County, Mill Creek Canyon, March 15, 1943. Many specimens of both sexes. * *

Previously known from Colorado, near Glenwood.

Oriulus medianus Chamberlin.

Localities.—Montana: Three Forks, one male taken August 17, 1941; 6 miles west of Belgrade, August 17, 1941, several specimens of both sexes.

Wyoming: Fremont County, Brooks Lake Falls, August 12, 1941, four specimens, both sexes; Madison Junction, August 15, several; Teton County, Leeks Camp, August 13, three, and Turpin Meadows, August 13, many specimens.

Colorado: Douglas County, 20 miles southwest of Sedalia, August 6, 1941, several specimens, both sexes; Lorimer County, Rustic, August 7, 1941, many specimens, both sexes. Jackson County, Cameron Pass, 10,000 feet elevation, August 8, 1941, about a dozen specimens, both sexes.

New Mexico: Escabosa, May 30, 1941, one male.

Caliulus montanae Chamberlin.

Localities.—Montana: Brown, el. 5060 feet., August 19, 1941, numerous specimens of both sexes.

Idaho: Humphrey, August 20, 1941, many specimens of both sexes.

Ziniulus navajo, new species.

Fig. 6.

Distinguished from the two previously known species, both of which occur in Texas, in smaller size and conspicuously in the details of the posterior gonopods, one of the accessory branches of which forms a support or partial sheath for the slender principal or seminiferous blade. (See further fig. 6). Anterior gonopods as shown in fig. 00.

Body with a median dorsal black line on each side of which there is a longer posterior transverse white or yellow-white line uncate at outer end and a shorter anterior one; a black spot found on each side of each segment by the repugnatorial gland with adjacent to and mostly below this a light area which may be divided into two or more spots toward legs on each segment a large, subelliptic, light spot; elsewhere the surface is brown to brownish black. Last tergite and anal valves dark, sometimes nearly solid black. Antennae dark brown to black, the legs mostly light yellow or in part dusky.

Cardo of mandibles in male with caudal distal corner moderately produced.

Last tergite ecaudate.

Number of segments, 50-53.

Diameter up to 1.4 mm., as against 2 and 2.3 mm. in *aethes* and *medicolens* respectively.

Locality.—New Mexico; Mountainair, 6 miles south, May 31, 1941, three adult males and a female; 5 miles south of Tijeras, May 30, three females; south of Fort Stanton, May 31, three females; north of Glencoe, May 31, one female and two young.

JULIDAE.

Diploiulus luscus (Meinert).

Localities.—Utah: Salt Lake City, April and May, 1942, common in the city proper.

Wyoming: Notrona County, Casper, August 10, 1941, many specimens.

Diploiulus londinensis caeruleocinctus (Wood).

Localities.—Utah: Salt Lake City, Univ. of Utah, campus, March 25, 1942, two specimens, and several specimens in April and November, 1942.

Brachyiulus pusillus (Leach).

Locality.—Utah: Salt Lake City, April, 1942, many specimens.

SPIROBOLIDA.

Eurelus proximus Chamberlin.

Locality.—Texas: Hidalgo County, 6 miles east of Edinburg, June 5, 1941. One female. This is near the type locality for the species.

Eurelus kerrensis Chamberlin.

Locality.—Texas: Kerr County, Raven Ranch, July 10, 1941. One male. The type locality for the species.

Eurelus mulaiki, new species.

Figs. 7–11.

A species much resembling in general appearance *E. kerrensis* and other known species of the genus. The color of the body varies from olive brown to olive gray and nearly black when in full color, with a band of deeper color about the caudal borders of the segments. Legs also dark, deep chocolate or black when in full color.

Readily distinguished from *E. kerrensis*, *E. proximus* and *E. soleatus* in not having the claws of fourth to seventh pairs notably reduced, and the claws of the first pairs but little reduced.

Also distinct from other species in the form of the coxal processes of the third legs in the male, these being narrower, more sclerotized and curved as shown in fig. 9; these processes extend over the bases of the next two pairs of legs. The processes of fourth and fifth coxae thin and lammellar and of form shown in fig. 10 and 11. Processes of sixth and seventh coxae erect and relatively thick and low.

The anterior and posterior gonopods are as represented in figs. 0 and o.
Number of segments, 47-49.

Length, up to about 50 mm.; width, to 6 mm.

Localities.—New Mexico; North of Glencoe (type locality), May 31, 1941, about a dozen specimens of both sexes; Ft. Stanton, May 31, five specimens; 6 miles south of Mountainair, May 31, twelve specimens; Tijeras, May 30, about fifteen specimens.

Spirobolus scotti, new species.

Figs. 12-14.

Color dark brown to blackish with a chestnut or reddish band about caudal border of each segment which reaches forward nearly to the posterior sulci; collum with anterior and posterior borders reddish. Legs reddish.

Principal sulcus sharply impressed across dorsum, angled at level of pore, the caudal margin of which lies in contact with the angle; secondary or anterior sulcus also distinct throughout. Surface of segments marked densely with punctae and fine, short, impressed lines.

Second tergite produced ventrad into a subacutely pointed process extending well below level of collum.

The third legs in male with coxal processes lamellate, the distal margin oblique, forming with the mesal margin an acute mesodistal angle. (Fig. 14). Processes of fourth, fifth and sixth coxae similar but progressively smaller, less compressed and distally more rounded; processes of seventh coxae low and blunt.

Anterior gonopods (Coleopods) and posterior gonopods as drawn (Figs. 12 and 13).

Number of segments, typically 55-57.

Diameter, to 7 mm.

Locality.—Texas: Harris County, Houston, September-December, 1941, A male and three females (Russell Scott).

This species differs from *S. oklahomae* as well as from the larger *S. marginatus* in the form of the processes of the coxae of the third legs in the male as well as in the details of the gonopods.

SPIROSTREPTIDAE.

Orthoporus flavior Chamberlin.

Locality.—Texas: Terrell County, 10 miles east of Dryden, June 3, 1941, one adult female 8.8 mm. in diameter; Hudspeth County, Sierra Blanca, June 2, one partly grown; Brewster County, Marathon, June 2 one small female.

The holotype is a not fully mature male taken 4 miles east of Dryden in September of 1939.

Orthoporus texicolens Chamberlin.

Locality.—Hidalgo County, Edinburg, June 4, 1941. Four partly grown specimens of this species, the holotype of which was from the same place.

Also in same County at Donna, July 8, 1941, a male and female of smaller than usual size, collected by Holdane Bell; Bexar County, 5 miles south of Helotes, June 23, 1941, two females, probably this species.

***Orthoporus vallicolens*, new species.**

Differing obviously from *O. texicolens* and *O. flavior*, previously recorded Texas species, in coloration. The ordinary segments are brown with a chocolate colored band about caudal portion of metazonite which in most cases does not extend forward to the segmental sulcus. Collum, last tergite and anal valves brown. Legs chocolate colored.

Also distinguishable from the species mentioned in the form of the wing of collum and the usual number and form of its striae as represented in fig. 15. Segmental sulcus smooth, deeply impressed throughout, widely curved opposite the pore from which it is well removed.

Number of segments, 70-73.

Length, 100-110 mm.; width, to 9 mm.

Localities.—Hudspeth County, Ft. Hancock, June 1, 1941, numerous specimens the males among which are not fully mature; Val Verde County, Lantry, June 3, 1941, eight females. The collectors state that these millipeds were excessively abundant after heavy recent rains and occurred on and beneath bushes which they had ascended.

EXPLANATION OF FIGURES.

Fig. 1. *Sigmoria houstoni*, n. sp. Right gonopod of male, caudal view.

Fig. 2. *Nannaria ursa* Chamberlin (Specimen from Ruidosa). Left gonopod of male, caudal view.

Fig. 3. The same. (Specimen from Glencoe).

Fig. 4. *Utoiulus utus* (Chamberlin). Anterior gonopods, anterior view.

Fig. 5. The same. First right leg of male, caudal view.

Fig. 6. *Ziniulus navajo*, n. sp. Distal portion of left posterior gonopod.

Fig. 7. *Eurelus mulaiki*, n. sp. Anterior gonopods, anterior view.

Fig. 8. The same. Right posterior gonopod, caudal view.

Fig. 9. The same. Coxal process of third left leg of male, ventral view.

Fig. 10. The same. Basal joints of fourth left leg of male, showing coxal apophysis.

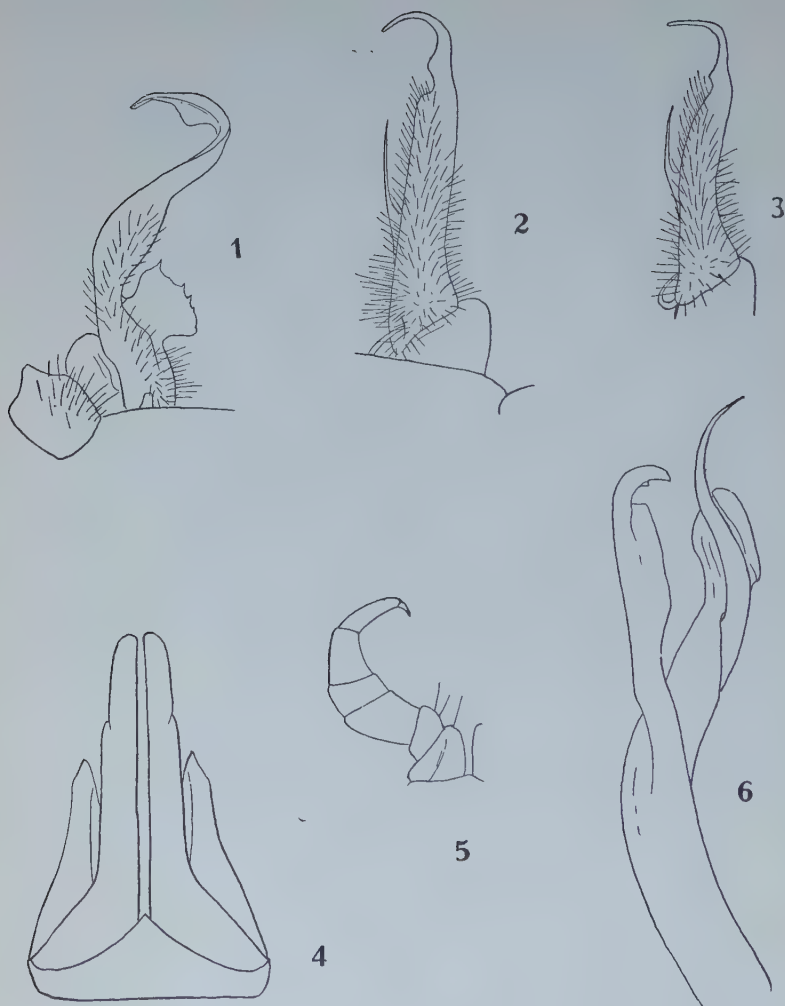
Fig. 11. The same. Coxa of fifth left leg of male.

Fig. 12. *Spirobolus scotti*, n. sp. Anterior sternal plate and right anterior gonopod of male, anterior view.

Fig. 13. The same. Left posterior gonopod of male, antero-mesal aspect.

Fig. 14. The same. Two basal articles of left third leg of male, anterior view, showing form of coxas process.

Fig. 15. *Orthoporus vallicolens*, n. sp. Lower part of right side of collum, lateral view.





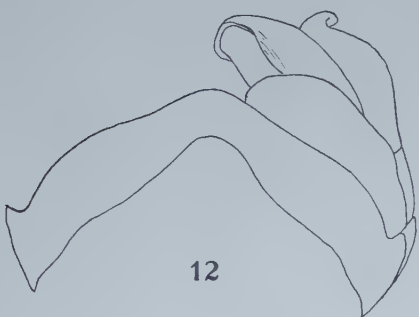
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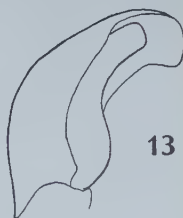
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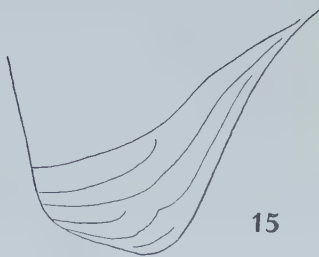
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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

CRITICAL REMARKS ON THE TOUCANS.

BY W. E. CLYDE TODD.

The Ramphastidae, or Family of Toucans, are represented in the collection of the Carnegie Museum by 670 specimens¹, belonging to 55 species and subspecies. The group appears to reach its highest development in the Amazonian region, from which we have excellent series of nearly all the endemic forms. With material of such good quality available, the temptation is very strong to undertake a complete review of the entire group from the taxonomic and geographic stand-points, as Dr. Frank M. Chapman has satisfactorily done for the Motmots. But since such a comprehensive study would require more time than I can well spare, I shall content myself by putting on record certain of the more important points discovered in working up our collection. For the loan of additional specimens pertinent to the inquiry my thanks are due to the authorities of the U. S. National Museum, the American Museum of Natural History, the Museum of Comparative Zoölogy, and the Field Museum.

Concerning the limits of the genera in this family there is virtual agreement, but the number of species which merit recognition is still far from settled. The hindrances and difficulties besetting the path of the investigator venturing into this field are suggested and are aptly illustrated by Messrs. Griscom and Greenway in their remarks on *Ramphastos tucanus* (Bulletin Museum Comparative Zoölogy, 71, 1937, 427-429). In the absence of any accepted criteria for discriminating between specific and subspecific characters, most recent authors have underestimated the value of the coloration of the bill as a taxonomic differential. I hold that the striking and constant differences in this respect between allied forms in this group are of themselves amply sufficient to justify specific segregation. In several cases, certain of

¹Including 59 specimens disposed of by exchange.

which are here for the first time pointed out, the respective ranges of related forms have been found to overlap, which circumstance places their specific distinctness beyond question. Because these differences in bill coloration are of course less obvious in preserved specimens than in the living bird, color sketches of the various forms made from live or freshly killed birds would be a welcome contribution.

GEOGRAPHICAL VARIATION IN *RAMPHASTOS TOCO*.

This Toucan was first made known by Daubenton (Planches Enluminées, pl. 82) under the name "Toucan de Cayenne". Buffon added a brief description but omitted mention of any locality. The date of publication of this plate is not exactly known, but it could not have been earlier than 1770 or later than 1776, when Müller gave the bird which it represents a proper binomial name, calling it *Ramphastos toco*. According to Comte de Germiny (L'Oiseau, 11, 1930, 657), "Toco" is a name used for a species of Toucan by the Arawak Indians of Guiana and the Orinoco Basin. *R. toco* is a well-known species of wide range, which extends southward to Argentina and westward to Bolivia. Its occurrence in French Guiana, however, is not so well attested, and there are no recent records from that country. Mr. Samuel M. Klages failed to find it there. Aside from the original reference, which is perhaps open to question, I know of but one actual record, in von Pelzeln, Ornithologie Brasiliens, part 3, 1870, 233, footnote².

The matter of the type-locality becomes important in view of the tendency of the species to vary geographically. Specimens from the southern part of the range of the species not only average smaller but also have more uniformly white throats than those from the northern part. They are entitled to the name *albogularis* of Cabanis (Journal für Ornithologie, 10, 1862, 334), based on the bird of southern Brazil and Paraguay. Of this race I have examined in our collection three specimens from southern Bolivia (Yacuiba) and one from northern Argentina (Miraflores), and also in other collections nine from Paraguay and three from Brazil. A specimen from Las Palmas, Chaco, Argentina (No. 284,814, U. S. National Museum) I would refer to this race, although it has a very narrow black line around the bill at the base. A specimen from Fort Wheeler, Paraguay (No. 149,448, American Museum of Natural History), is definitely intermediate between *toco* and *albogularis*. Stolcman (Annalibus Zoologicis Musei Polonici Historiae Naturalis, 5, 1926, 135) was apparently the first author to revive Cabanis' name for the south Brazilian bird. This action was later indorsed by Brodkorb (Occasional Papers Museum Zoology, University of Michigan, No. 349, 1937, 3) and by Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 88, 1941, 194).

The latter authors inadvertently attribute the name *albogularis* to Cassin instead of to Cabanis. Inadvertently also they state that lower Amazon specimens "do not differ from a Cayenne series in the Carnegie Museum"—a statement not to be reconciled with the fact that we have

² For calling my attention to this I am indebted to Mr. John T. Zimmer.

no specimens from Cayenne or any other place in French Guiana. They further state that "Specimens from Bolivia . . . are inseparable from *toco*." With this dictum I disagree if our four birds from Santarem correctly represent that form. Our adults from this locality agree in that the throat is distinctly tinged with yellow and its lower border strongly red. In our Bolivian series, on the other hand, the throat is white with little or no yellow tinge and has a mere trace of a posterior red border; the pileum, too, is generally duller, brownish rather than black. In all these respects the Bolivian birds more nearly agree with Daubenton's plate than do the Santarem specimens. There is reason to believe that these two series respectively represent different subspecies. I am restrained from describing one or the other of these as a new race only by uncertainty as to which of them is the true *toco*. Mr. Zimmer writes me that specimens in the American Museum from the lower Amazon agree well enough with Chubb's description of a male from British Guiana (Birds British Guiana, 1, 1916, 453) to make him think that there is likely to be little distinction in this general region. The possibility remains, however, that the yellow-throated birds represent a race which is confined to the region south of the Amazon and east of the Rio Tapajóz. Final conclusions on the points here raised must await the receipt of more pertinent material.

RAMPHASTOS TUCANUS, R. CUVIERI, AND R. INCA.

These three forms constitute a natural group, characterized by their white throats and yellow or orange upper tail-coverts. They are distinguished from each other mainly by their differently colored bills. Some authors consider them races of one inclusive species, for which they use the earliest name, *tucanus* of Linnaeus. From this conclusion I dissent, since I hold that the color of the bill in this case is a character of specific value. This is certainly strongly suggested by the fact that within the range of *R. tucanus* there lives a fourth member of this particular group, *R. aurantiirostris* Hartert, whose main claim to distinction is in its differently colored bill. I have examined four specimens of this bird from British Guiana (in the Rothschild Collection, now in the American Museum) and have no difficulty in recognizing it as specifically distinct from *R. tucanus*.

Although Hartert (Novitates Zoologicae, 32, 1925, 143) refused to accept the name *tucanus*, Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 81, 1937, 430) have validated it by restricting its application to the dark-billed bird of Surinam. Our French Guiana specimens (five) clearly belong to this form, as do also those from the Rio Caura (Rio Mocho). Our single Pará specimen (Benevides) is indistinguishable from the rest except for its obviously longer bill. Otherwise I see absolutely no evidence or suggestion of any approach to or intergradation with *R. cuvieri*. According to Griscom and Greenway the latter is the form that occupies the region west of the Rio Tapajóz. Relying on Hellmayr's statement (Novitates Zoologicae, 17, 1910, 396) that Rio Madeira specimens agree with Wagler's type,

they fix on Borba as the type-locality (*ex* von Pelzeln)—a perfectly proper procedure. For the population east of the Rio Tapajóz they set up a new name, *oblitus*. I cannot understand why they compare their new form primarily with *tucanus* and make it a subspecies thereof. It has nothing to do with *tucanus*, from which it is indeed “strikingly different,” but it is so closely related to *cuvieri* that it is hard to find characters to separate it therefrom. I cannot verify any essential difference in size between the two, but the upper tail-coverts are more shaded with orange in *cuvieri*, and purer yellow in *oblitus*. Also, the red pectoral crescent is perhaps a little narrower in *oblitus*.

Our specimens of *cuvieri* come from the upper and middle Amazon (São Paulo de Olivença, Manacapurú) and the Rio Purús (Hyutanahan, Nova Olinda, Arimã), with one specimen from Bolivia (Buena Vista). As noted by other authors, the color of the upper tail-coverts varies somewhat, but it is always more or less orange- or crimson-shaded—different from the almost pure yellow of *oblitus*. I fail to see how birds from Mount Duida, Venezuela, could possibly be intermediate between these two races, as claimed by Griscom and Greenway, and actual examination of the specimens in question confirms this doubt. They are easily referable to *cuvieri* in coloration but are slightly smaller in size. Specimens in the American Museum from Amazonian Colombia (Florescia and Barrigon), eastern Ecuador, Matto Grosso (one from Rio Teodoro), and Venezuela (Munduapo, Rio Orinoco) I refer without hesitation to *cuvieri*, although certain of them show a faint indication of dark reddish color at the base of the upper mandible. (The Munduapo example is the one discussed by Hellmayr in L'Oiseau, n.s., 3, 1933, 247.) One of our specimens from Manacapurú shows the same character. While the differences between *tucanus* and *cuvieri* are perfectly obvious even in preserved skins, they are better brought out by Mr. Klages' descriptions of the coloration of the bill in fresh specimens. In *tucanus* the bill is “dark sanguineous red, with blackish *nebulae*; culminal stripe bright greenish yellow; basal band cerulean blue.” In *cuvieri* the maxilla is “black, with a blotch of dark blood red; basal and culminal bands light greenish yellow; mandible lemon or citrine yellow, with a basal band of azure; adjoining this azure band there is an azure line on the maxilla also.” In dried specimens of *cuvieri* the sides of the bill are virtually uniform black, while in *tucanus* they are largely dull yellowish red.

Considerable controversy has arisen over the status of *Ramphastos inca* Gould, originally described from a single specimen from Bolivia. Zimmer (Field Museum Zoological Series, 17, 1930, 305) would throw it out, and Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 81, 1937, 428) “agree heartily.” But with a series of nine specimens (all from Buena Vista, Bolivia) available in our collection, I find that *inca* is a perfectly good form; and I believe it should be ranked as a species—if for no other reason than that we have one entirely typical specimen of *cuvieri* from Buena Vista, as already noted. At any rate, it is certainly not subspecifically related to *tucanus*, than which it has a much larger and differently colored bill; its upper tail-coverts are orange,

not pure yellow; and its crimson breast-band is wider. If anything it is more nearly related to *cuvieri*, which it resembles in all respects except in the color of the bill. Unfortunately none of the labels on our specimens give the bill colors; but the dried specimens certainly differ decidedly and constantly from both *tucanus* and *cuvieri* in the colors of this part, and undoubtedly this difference would be emphasized in the living birds. Most of our specimens have the bill much more extensively pale (reddish in life?) on the sides (both mandibles) than Gould's figure, which shows only a small red area near the base of the upper mandible. Four specimens in the American Museum collection from Bolivia agree precisely with ours. Our series alone suffices to validate *inca*, but its exact range remains to be worked out. While von Berlepsch and Hartert record it from Munduapo, on the upper Orinoco, I have little hesitation in referring their specimen from that place to *cuvieri*, as I have already said. Chapman (Bulletin American Museum of Natural History, 55, 1926, 345-6) lists specimens of the latter from Colombia to Bolivia. Accordingly the ranges of *cuvieri* and *inca* must overlap—as indeed we know they do. It is desirable to examine and to compare specimens from other localities in this connection.

AN INTERMEDIATE RACE OF RAMPHASTOS SULFURATUS?

I follow Peters, Griscom, and Van Tyne in adopting *sulfuratus* as the specific name for this form. (The original orthography is as here given.) I have compared our considerable series of specimens from British Honduras with specimens from Mexico (Vera Cruz) and Guatemala and have found them to be the same. I fully agree with Van Tyne (University of Michigan Museum of Zoology, Miscellaneous Publications No. 27, 1935, 22-24) that they should be called *sulfuratus*; if not, then they would have to stand as a connecting race, *intermedius* of Carriker and DeSchauensee (Proceedings Academy Natural Sciences of Philadelphia, 87, 1935, 427). But so many of our British Honduras birds are indistinguishable from Mexican birds, either by the size of the bill or by the width of the red post-pectoral band, that the proposed separation seems highly questionable; and I am inclined to ignore it in naming our specimens.

THE IDENTITY OF RAMPHASTOS AMBIGUUS.

Ramphastos ambiguus of Swainson (Zoological Illustrations, 3, 1823, pl. 168) was based solely on a colored drawing by an unknown artist, made "from the bird just dead." The locality was also unknown, and as to the size of the bird the drawing gives no clue whatever. Gould (Monograph Ramphastidae, ed. 2, 1854, pl. 5 and text) used the name for the larger bird of the Bogotá region of Colombia, and in so doing he has been followed by later authors, down to Ridgway (1914) and Chapman (1917). The latter author even suggests Buena Vista, Colombia, as the type-locality. But after a comparison of our specimens with Swainson's original description and figure I am convinced that these actually

represent the smaller Colombian form of *Ramphastos* identified (wrongly as I believe) by Chapman as *abbreviatus*. Presumably, the plate shows the bird in its natural colors, and those of the bill correspond closely with the colors noted by Carriker on the labels of his specimens, as follows: male (No. 64,597, Quibdó, Colombia), "bill black below, bright yellow above; ridge pale blue." Female (No. 66,878, Cordoba, Colombia), "bill black below, yellow above." And by the same token, they do *not* correspond with the bill colors of the larger form from interior Colombia as recorded on the labels. Since the matter of size is not in question and the relative proportions are the same in both forms, I do not see how we can avoid taking Swainson's name *ambiguus* for the form which it best fits, regardless of previous usage. Measurements of our three specimens agree very well with those cited by Chapman (Bulletin American Museum of Natural History, 36, 1917, 329). Compare also, in this connection, Lönnerberg and Rendahl's remarks (Arkiv för Zoologi, 14, No. 25, 1922, 65) on Ecuadorean specimens. *Ramphastos ambiguus*, as here defined, is a bird of the Tropical zone of western Colombia and western Ecuador.

This shift leaves the larger bird of interior Colombia nameless, so I propose to call it

***Ramphastos innominatus*, sp. nov.**

Type, No. 59,280, Collection Carnegie Museum, adult male; El Tambor, Santander, Colombia, January 12, 1917; M. A. Carriker, Jr.

Description.—Black, the nape and the sides of the neck more or less shaded with maroon; upper tail-coverts white; throat and breast lemon yellow, bounded posteriorly by a narrow and indistinct whitish line followed by a band of nopal red; rest of underparts black except the under tail-coverts, which are nopal red; "iris olive gray; feet cobalt blue; bill blackish maroon, greenish yellow on ridge" (Carriker). Wing (type), 228 mm.; tail, 161; tarsus, 54; exposed culmen, 174; width of bill at base, 40.

In the case of another specimen (No. 36,289, El Hacha, Venezuela) the bill is described in more detail: "the dark portion is black, with a shade of dark blood red towards the base; the light portion is Indian yellow, the ridge shaded with grass green. The exposed skin of the orbital region is greenish yellow, more green around the eye."

Range.—Subtropical Zone of the Andes of Colombia and Venezuela, and southward into Ecuador and Peru (*vide* Chapman, Bulletin American Museum of Natural History, 55, 1926, 345).

Remarks.—This is the *Ramphastos ambiguus* of Chapman and (in part) of earlier authors, but not of Swainson, as I have tried to show. It appears to be a zonal representative of *R. swainsoni* of the Tropical Zone, and preserved specimens of the two sometimes resemble each other rather closely. However, even in dry skins the lower mandible is uniformly darker than in *swainsoni*, and in life the color-differences must be accentuated. The species is represented in our collection by four specimens: one from El Hacha, Venezuela; two from El Tambor, Colombia; and one from Palmar, Colombia.

At this point there arises the question of the real identity of *Ramphastos abbreviatus* Cabanis, Journal für Ornithologie, 10, 1862, 334. The possibility that this name might pertain to the form under consideration must be taken into account. Cabanis' description is brief and unsatisfactory; translated, it runs as follows: "Somewhat smaller [than *tocard*, i.e., *swainsoni*]; bill a little over $4\frac{1}{2}$ " long; crown, nape, upper back, and the black underparts, especially the breast, reddish-shaded. Naked eye-region, according to the collector, green." Puerto Cabello, on the coast of Venezuela, is given as the type-locality. The species must be very rare, since no recent collectors have encountered it. However, I have examined a specimen labeled "Caracas"—the same as is discussed by Cassin, Proceedings Academy Natural Sciences of Philadelphia, 1867, 104. Its bill is badly broken and has been mended, so that satisfactory measurements cannot be taken. As the bill stands it is about the same size as that of a young specimen of *swainsoni*; the cutting edge of the maxilla is smooth, without trace of teeth—a condition which suggests immaturity. However, the dark band on the maxilla is sharply defined. Wing, 212 mm.; tail, 157; tarsus, 50; bill from gape, 150. The crown and neck are strongly washed with purple maroon—much more deeply than in any other specimen of related forms with which I have compared it.

One thing is certain: this bird has nothing to do with the small *Ramphastos* from the Pacific coast region of Colombia which Chapman calls *abbreviatus*. On geographical grounds alone such an allocation would be highly improbable. Nor can it be satisfactorily identified with the larger form from the interior of that country which he calls *ambiguus*—wrongly as I believe. Examination of the type-specimen might settle the question, but not if the sex and age of the bird are unknown. Our specimen from El Hacha is clearly not the same species as the bird from Caracas described above. From present information it is probable that in the Tropical Zone of the north coast of Venezuela there lives a Toucan allied to *Ramphastos swainsoni*, but with a smaller bill and a strongly maroon crown and nape. For this form Cabanis' name *abbreviatus* would be pertinent, but for the present the exact application of the name must remain doubtful.

We have one specimen of Toucan from La Azulita, Venezuela, which almost certainly represents a second race of *innominatus*, peculiar to the Maracaibo Basin. In size and in the color of the bill it agrees with the female from Palmar. But the red pectoral band is wider and extends downward over the breast, and the black of the underparts is more or less washed with maroon. The form impresses me as a good one, but I hesitate to describe it on the basis of a single specimen.

A NEW LOCALITY FOR RAMPHASTOS CITREOLEMUS.

A specimen of this species from Santa Elena, Venezuela (No. 90,659) extends its range to the Maracaibo Basin. The specimen differs in certain respects from our single skin from Colombia (El Tambor) and may possibly belong to a new race.

THE RAMPHASTOS VITELLINUS GROUP.

Ramphastos vitellinus Lichtenstein and *R. ariel* Vigors are admittedly closely related; but not so closely, in my opinion, as to justify uniting them as conspecies, as some recent authorities do. Moreover, their respective ranges are separated by the Amazon, with no possibility of intergradation. Just where the range of *ariel* meets that of *theresa* and whether they intergrade are still undetermined. *R. culminatus* Gould is another member of this group and is regarded by Zimmer (Field Museum Zoological Series, 17, 1930, 306) as also conspecific. With this I disagree, as do Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 88, 1941, 146). (Compare also Hellmayr, Novitates Zoologicae, 17, 1910, 397.)

In *culminatus* the throat is normally white, but in some specimens there is a wash of yellow along its lower edge. The so-called *osculans* (discussed by Zimmer, *l.c.*, and by Hellmayr, L'Oiseau, n.s., 3, 1933, 244-251) is probably based on hybrids between *culminatus* and *vitellinus*. I have seen no specimens of undoubted *osculans*, but the variability which characterizes it would suggest hybridism rather than racial intergradation. The locality Rio Negro would be just the place where this would be expected to occur. Thus, we have *vitellinus* from Obidos, on the Amazon east of the Rio Negro, and *culminatus* from Manacapurú, west of this stream. Chapman is perfectly correct in claiming that *culminatus* and *cuvieri* are distinct from each other (Bulletin American Museum of Natural History, 55, 1926, 346), and our series confirms his views.

A NEW RACE OF PTEROGLOSSUS TORQUATUS.

Pteroglossus torquatus pectoralis, subsp. nov.

Type, No. 90,725, Collection Carnegie Museum, adult male; Santa Elena, Zulia, Venezuela, August 17, 1922; M. A. Carriker, Jr.

Subspecific characters.—Similar to *Pteroglossus torquatus nuchalis* Cabanis of the coast region of Venezuela and the Santa Marta region and Magdalena Valley of Colombia, but bill larger; black pectoral spot larger; and black band across abdomen blacker and wider.

MEASUREMENTS (IN MILLIMETERS).

No.	Sex	Locality	Wing	Tail	Bill	Depth of bill	Tarsus
90725 ¹	♂	Santa Elena	144	158	117	31.5	31
90726 ¹	♀	Santa Elena	143	154	108	31	33
34508 ²	♂	Encontrados	140	155	102	31	32
43403 ²	♀	Empelado Savanna	145	153	98	29	34

¹ Collection Carnegie Museum.

² Collection Field Museum.

Range.—Maracaibo Basin of Venezuela.

Remarks.—This is an easily recognizable form, if the specimens

above listed are a fair sample of the population of the Maracaibo region. No specimen of our series of *nuchalis* (twelve skins) has a bill so large. A third specimen from Santa Elena is a young bird. Recognition of this race leaves the range of *nuchalis* discontinuous, since it is divided by the Gulf of Maracaibo. The male type has a large pectoral spot, which is joined above to the black of the throat.

PTEROGLOSSUS AZARÆ AND ITS ALLIES.

Pteroglossus azaræ is precisely like *P. flavirostris* Fraser and *P. mariæ* Gould in the color of the body-plumage, but it differs in the color of the bill. In the dry skin the mandible is pure yellow, but the maxilla has a dark streak for its full length, above the commissure. In freshly killed specimens, according to S. M. Klages, the bill is "white, with a greenish yellow tinge, and a narrow band of light chrome yellow around the base, and a broad stripe of dark blood red on the sides of the maxilla; serrations white, with light sanguineous red spaces between." Our two specimens come from Manacapurú, on the middle Amazon.

In fully adult examples of *P. flavirostris* the principal specific character of this form, the elongated patch of ochraceous color along the cutting edge of the mandible, is perfectly obvious in the dry skin. In younger individuals this color is more diffuse and spreads out more over the mandible; then the effect is more as in *mariæ*. These immature examples also have the black band on the lower throat poorly defined and invading the red of the pectoral band. S. M. Klages gives the bill in fresh specimens as "whitish, with a faint greenish wash; edges of maxilla alternately white and black; apical third of culmen pale olivaceous green; sides of mandible with a stripe of pale shellac brown."

Our thirty-four specimens of *flavirostris* all come from the upper Amazon in Brazil (São Paulo de Olivença and Tonantins), but Hellmayr (Novitates Zoologicae, 14, 1907, 83) says that Natterer's specimens from the Rio Negro belong here, and von Berlepsch and Hartert (*ibid.*, 9, 1902, 101) give it from the Orinoco and Caura Rivers in Venezuela. I should discredit the supposed record from the Oyapock River in French Guiana, however.

Pteroglossus mariæ was discriminated by Gould, but it was soon relegated to the synonymy of *P. flavirostris*, until revived as a subspecies by Hellmayr (Novitates Zoologicae, 14, 1907, 83). It differs from *flavirostris* by having the entire lower mandible brown (in the skin) in adult birds. The bill in fresh specimens is thus described by S. M. Klages: "maxilla white, the ridge slightly tinged with ochraceous, its edges black. Mandible shellac brown, with the tip yellowish white, and a pale ochraceous band at the base." In younger birds the bill is not so deeply colored as in adults, and these might be taken for *flavirostris* were it not for the fact that the maxilla is unicolored, while in the same stage of *flavirostris* it has dark-colored areas. We have perfectly typical specimens of both *flavirostris* and *mariæ* from São Paulo de Olivença, where the respective ranges of the two forms overlap. They must there-

fore be ranked as species. In general, however, *flavirostris* inhabits the region north of the Amazon, and *mariae* the region south thereof, as Hellmayr has pointed out. We have a series of fourteen specimens of the latter, from Hyutanahan and Nova Olinda on the Rio Purús, and São Paulo de Olivença and Caviana on the Amazon, and also one from Rio Chapare, Bolivia, which is referred here provisionally (its bill is pale below).

A NEW LOCALITY FOR *SELENIDERA NATTERERI*.

A female specimen of this rare species from Tonantins, on the upper Amazon, agrees well in the color of the bill with the description of *Selenidera nattereri*, and also with a male specimen of this species in the collection of the American Museum from the Caura River in Venezuela. We have females of *S. langsdorffi* in which the yellowish orange area on the sides of the body is barely indicated; by analogy this might account for the peculiarities of our specimen in this respect. The record involves a considerable extension of the heretofore known range. *S. langsdorffi* appears to be confined in Brazil to the south bank of the Amazon.

TAXONOMIC NOTE ON *SELENIDERA GOULDI*.

It was von Pelzeln (Ornithologie Brasiliens, pt. 3, 1870, 238) who first called attention to the difference between specimens of this species from Pará and those from the Rio Madeira. Hellmayr (Novitates Zoologicae, 17, 1910, 400) also noted a difference but considered that it should be confirmed by more material. Griscom and Greenway (Bulletin Museum Comparative Zoölogy, 81, 1937, 431) thereupon named the alleged western race in honor of Hellmayr. In their later paper they refer all our Rio Tapajóz birds to their new race and list two males and two females from the left bank. This listing is wrong. We have but two males, one from Miritituba on the east bank, and one from Itaituba on the west bank. The former agrees closely with Gould's figure (Monograph Ramphastidae, ed. 2, pl. 32). The Itaituba male has much less black on the bill and is thus nearer the new form *hellmayri* as described. From this it would appear that the Rio Tapajóz is the dividing line between the two supposed forms, but I cannot satisfactorily distinguish two females (from Itaituba and Villa Braga) from Santarem females. After having examined Griscom and Greenway's material (except the type) and four other specimens from the lower Amazon in the American Museum, I find that the range of variation (especially as regards the black area on the bill) is so great that I cannot satisfactorily discriminate *hellmayri*.

In any case, I cannot agree to uniting *gouldi* and *maculirostris* as conspecies.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW FOX SPARROW
FROM THE NORTHWESTERN UNITED STATES.

BY JOHN W. ALDRICH,

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Current investigations reveal the existence of a new subspecies of fox sparrow in the northwestern United States and southwestern Canada, which I propose to call:

Passerella iliaca olivacea new subspecies

WASHINGTON FOX SPARROW.

Type.—Adult ♂, U. S. National Museum No. 270664 (Biological Surveys Collection); Reflection Lake, Mount Rainier, Washington, altitude 4,900 feet; July 18, 1919; Walter P. Taylor; original number 478.

Subspecific characters.—Similar to *Passerella iliaca schistacea* of Wyoming, but darker and more olivaceous; above dark hair brown to olive brown (of Ridgeway), instead of light hair brown to light olive brown; edges of wing and tail feathers, and upper tail coverts Brussels brown to Argus brown, instead of cinnamon brown. Similar also to *P. i. fulva*, of central southern Oregon, but more brownish; above dark hair brown to olive brown, instead of mouse gray to hair brown; edges of wing and tail features, and upper tail coverts more rufescent, Brussels brown to Argus brown, instead of cinnamon brown to Prout's brown; bill shorter and more slender.

Measurements.—Adult male (9 breeding specimens from Washington and northeastern Oregon): wing, 80.0-83.5 (81.5) mm.; tail, 77.5-82.0 (80.1); exposed culmen, 10.5-12.0 (11.2); tarsus, 23.5-25.5 (24.3); middle toe without claw, 14.0-15.0 (14.7). Adult female (5 breeding specimens from Washington and southern British Columbia): wing, 75.0-80.0 (77.1); tail, 71.0-81.5 (75.9); exposed culmen, 11.0-12.0 (11.5); tarsus, 23.0-24.0 (23.7); middle toe without claw, 14.0-15.0 (14.4).

For the sake of comparison following are the measurements of *P. i. fulva*: Adult male (13 breeding specimens from Lake County, Oregon): wing, 77.5-84.0 (80.9) mm.; tail, 76.5-87.0 (81.3); exposed culmen, 11.0-13.0 (12.4); tarsus, 24.0-26.0 (24.8); middle toe without claw,

14.3-16.0 (15.3). Adult female (7 breeding specimens from Lake County, Oregon): wing, 76.0-82.0 (78.9); tail, 75.0-83.0 (78.8); exposed culmen, 11.0-13.0 (11.9); tarsus, 23.5-26.0 (24.6); middle toe without claw, 14.0-15.5 (14.7).

Distribution.—Breeds chiefly in the shrub and early tree stages (especially stream-bordering willow thickets) of succession to the subalpine forest in the Canadian Life Zone, also in the stunted tree growth at the junction line between this forest climax and the tundra climax of the Arctic-Alpine Life Zone. Less commonly it breeds in shrub stages of the montane forest climax of the Transition Life Zone. It is distributed geographically from the east slopes of the Cascade Mountains of Washington, eastward at least to the Blue Mountains of Washington and Oregon, the mountains of northeastern Washington, and probably to northern Idaho and northwestern Montana; northward in southern British Columbia at least to Nelson. The winter home of this race has not been determined, but migrant specimens have been identified from: Wyoming, Stanley, August 23, Kemmerer, May 16; Nevada, Ruby Mountains, August 18; Oregon, Hart Mountain, September 14; and California, Beswich, September 19.

Remarks.—Progressing away from the Cascade Mountains of west central Washington, the center of differentiation of *olivacea*, we find it intergrading with *schistacea*, in the vicinity of the Columbia River gap. A juvenal specimen from 10 miles north of Grand Dalles, Washington, near the Columbia River, is identifiable as *olivacea*. On the other hand specimens from the Cascade Mountains of Jefferson County, in northern Oregon, in color are indistinguishable from *schistacea*. A short distance farther to the south, at Bend, in Deschutes County, Oregon, we find the northern limit of the range of *fulva*. It does not seem logical to consider part of the Cascade Mountains within the range of the essentially Great Basin race, *schistacea*, but for the time being there seems to be no other course possible.

Specimens from Harney County, Oregon (Steens Mountains and Burns) are intermediate between *fulva* and *schistacea*, and were referred to the former race by Swarth (1920:159), and Miller (1941:263, map). On the basis of my material, however, birds from these localities, as well as a specimen from Howard and another from 20 miles southeast of Prineville, Crook County, Oregon, seem referable to *schistacea*. They definitely do not approach *olivacea*, which race apparently breeds no farther south than the Blue Mountains of Oregon. Specimens from the Blue Mountains and northward have been identified as *olivacea*, while examples from southeast of the Blue Mountains (Enterprise, Oregon) are nearer *schistacea*.

To the northward *olivacea* intergrades in some unknown region of southern British Columbia with the more rufescent *altivagans*, that has its center of differentiation in the Canadian Rockies. Probably most of the British Columbia specimens that in recent years have been identified as *schistacea* are referable to *olivacea*. As Swarth (1920:122) has pointed out, a juvenal specimen, taken by E. A. Preble at Thutade Lake,

at the source of the Finley River, British Columbia, is like topotypes of *altivagans*, from Moose Branch of the Smoky River, Alberta. On the other hand an adult in fresh autumn plumage, taken September 9, 25 miles southeast of Thutade Lake, and an adult that has almost completed the moult into autumn plumage, taken August 14, 15 miles west of Babine, British Columbia, are darker and more grayish than typical *altivagans*, and somewhat approach *olivacea*. These specimens undoubtedly represent the variant mentioned by Swarth (1920:123, and 1924:357) as intermediate between *altivagans* and the "*unalaschcensis* group" of subspecies. Further collecting of breeding fox sparrows in central British Columbia may convince us of the desirability of recognizing a distinct race there. A single breeding specimen from Buck Creek Pass, Snohomish County, Washington, stands out as distinct from typical *olivacea* by virtue of more brownish coloration and could represent a southern outpost of an interior British Columbia race. For the time being, however, the Snohomish County bird is placed with *olivacea*.

The possible eastward extension of the range of *olivacea* to northern Idaho and northwestern Montana, although no specimens have been seen from these regions, is suspected on the grounds that ecologically these regions are more closely related to the moister forests of northern Washington than to the more arid mountains of the Great Basin, the differentiation center of *schistacea*. Supporting evidence is found in specimens from southern Idaho and southern Montana which, although averaging nearer to *schistacea*, show in some specimens an approach to *olivacea*. As the geographic variation of North American birds becomes more completely analyzed it is becoming more and more apparent that the geographical area above delimited as the range of *P. i. olivacea* may be considered a unit that is a center of racial differentiation in birds. In some species there are two types of variants, separated more or less completely by the intrusion of the relatively arid Okanagan Valley, while in others there is uniformity with a connection across southern British Columbia. This is the area that, in its Transition Life Zone, is characterized by the Larch-Pine Association of Weaver and Clements (1938: 503). A similar unity, in this area, of the Canadian Life Zone subalpine forest has not yet been pointed out by ecologists. Nevertheless it seems probable that more critical study of this area in the future will show that qualitatively and quantitatively the major biotic communities of the Canadian Zone in this area as a unit are distinct from equivalent subalpine forest communities in either the Great Basin to the south or the main range of the Rocky Mountains to the east.

The conclusions in the present paper are based on specimens in the collections of the U. S. Fish and Wildlife Service (Biological Surveys), the University of Washington, Dr. Ira N. Gabrielson, and Stanley G. Jewett. Information on ecological requirements of fox sparrows in Washington was obtained from the literature and field notes, especially of Dr. Walter P. Taylor and George G. Cantwell, in the files of the U. S. Fish and Wildlife Service.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

A NEW LOCALITY RECORD FOR HOLBROOK'S
SALAMANDER IN THE DISTRICT OF COLUMBIA
VICINITY.

Holbrook's Salamander, *Eurycea longicauda guttolineata*, was first reported from the District of Columbia vicinity by Fisher (1887, Amer. Nat. 21(7): 672) on the basis of two specimens, one of which is now in the United States National Museum (No. 17662), which were collected by him near Munson's Hill, Fairfax County, Virginia. Since Fisher's initial record, which extended the range of this southern subspecies several hundred miles northward, there have been only two other records for it in the local region and both of these were also from Fairfax County. These specimens are in the United States National Museum and are as follows: No. 17556 - Dunn Loring, collected by J. D. Figgins, October 5, 1891; and Clifton (no number), collected by C. S. East, October 1935.

The purpose of the present note is to call attention to a new locality record for this rare salamander. This record consists of 5 individuals in the writer's personal collection secured February 21, 1943 in springs and seeps along Accotink Creek below the Annandale-Fairfax road, Fairfax County, Virginia. It is hoped that this new station, together with those given above, will help to more clearly define the distribution of this southern salamander at the northern limit of its range in Fairfax County, Virginia.

J. A. FOWLER.

ANOTHER FALSE MAP TURTLE FROM THE
DISTRICT OF COLUMBIA VICINITY.

Dunn (1918, *Copeia*, No. 53, Jan. 25, p. 23), in a preliminary list of the reptiles and amphibians of Virginia, includes the False Map Turtle, *Graptemys p. pseudogeographica*. His record, based on a juvenile specimen in the United States National Museum (No. 45617), was collected by W. Palmer at Custis Spring, Arlington County, Virginia on June 28, 1901. In a later list of Virginia herpetofauna, however, Dunn (1936, mimeographed, Haverford, Pa., pp. 1-5) does not mention this subspecies. Moreover the range for this turtle as given by Stejneger and Barbour (1939, Check List of North American Amphibians and Reptiles, 4th Edition, p. 162) indicates that it normally occurs in the Mississippi Valley region. Thus while the occurrence of this subspecies in the District of Columbia region is apparently fortuitous, it nevertheless seems of interest to call attention to another specimen collected by the writer on May 18, 1940 in the tide marsh along the District of Columbia-Virginia shore of "Little River" opposite Roosevelt (formerly Analostan) Island where it was associated with two other turtles, *Chrysemys p. picta* and *Sternotherus odoratus*.

J. A. FOWLER.

INDEX.

New names are printed in heavy type.

A			Aphelandra.....	53
abbreviatus, Ramphastos.....	158, 159		<i>gracilis</i>	54, 55
aberrantus, Gosibius.....	103		<i>pulcherrima</i>	55
acapulca, Phyllophaga.....	135, 139		aphylla, Buxbaumia.....	vii
Acarospora rufescens.....	20		Aporiaria.....	143
aegrota, Phyllophaga.....	24		<i>brunniar</i>	37, 40
aemula, Procinura.....	126		<i>fumans</i>	37, 40
aequatoriale, Apaloderma.....	14		<i>texicolens</i>	143
albugularis, Ramphastos toco.....	154		Arctogeophilus umbraticus.....	101
Aldrich, J. W., Report of the			<i>xenoporus</i>	102
observation of 6 pileated			Arebius convergens	105
woodpeckers in Rock Creek			<i>diploonyx</i>	105, 106
Park.....	viii		<i>dolius</i>	107
Breeding population stu-			<i>elysianus</i>	106
dies in the Washington, D. C.			<i>epelus</i>	105
region.....	ix		<i>fremontius</i>	106
Note on encounter be-			<i>medius</i>	106
tween a parasitic wasp and			<i>montivagus</i>	106
larva of a tiger beetle.....	ix		<i>navajo</i>	107
A New Fox Sparrow			<i>tetonus</i>	107
from the Northwestern United			<i>tridens</i>	107
States.....	163-166		Arenophilus bipuncticeps.....	100
alicea, Garrina.....	102		ariel, Ramphastos.....	160
Allenii, Beloperone.....	55		arizonensis, Gosibius.....	103
alpestris, Eremophila alpestris..	71		Arthropyrenia analeptella.....	19
alta, Stipa.....	79		atrocinctum, Homalocranium.....	117
altivagans, Passerella iliaca.....	164, 165		atrocinctus, Scolecophis.....	109, 117, 118
albiciliaris, Saltator aurantiros-			<i>atyphus</i> , Kethops.....	97
tris.....	33		aurancana, Calyptraea.....	41, 42
amandus, Scytonotus.....	143		aurantirostris, Ramphastos.....	155
amazonicus, Trogon rufus.....	11		aurantirostris, Saltator.....	34
ambiguum, Rhizocarpus.....	20		auriceps, Pharomachrus auri-	
ambiguus, Ramphastos.....	157, 158		<i>ceps</i>	4
ambiguus, Trogon ambiguus.....	7		australis, Curucujus.....	5
americana, Chloroceryle ameri-			<i>Trogon elegans</i>	7
cana.....	48		azarae, Pteroglossus.....	161
americanus, Numenius ameri-			azteca, Hylella.....	49
canus.....	69		B	
amylacea, Lecidea.....	19		<i>bacillaris</i> , Torrocoptis.....	31
analeptella, Arthropyrenia.....	19		<i>Urocoptis</i>	31
Ancylonychia rorulenta.....	131		<i>bairdi</i> , Trogon.....	6
Andropogon.....	77		<i>baneta</i> , Phyllophaga.....	133, 134, 139
<i>maderensis</i>	82		Bartsch, Paul. A Naturalist	
<i>scoparius</i>	83		in the Philippines.....	vii
<i>spadiceus</i>	82		Note on owls observed	
anguina, Graphina.....	20		near Fort Belvoir.....	ix
Anilus oreines.....	146		Leonhard Stejneger.....	ix
annamensis, Seicercus.....	29		A New Genus of Cuban	
annulatum, Lamprosoma.....	123		<i>Urocoptid Mollusks</i>	31
annulatus, Chionactis occipi-			and H. A. Rehder, New	
talis.....	123, 124		Cones from the Hawaiian	
Anolis cumingii.....	117		Islands.....	85-88
anoptiza, Lecanora.....	20		Baryphthengus martii costari-	
anthracina, Ruellia.....	53, 54		<i>censis</i>	48
Anthreptes.....	29		<i>semirufus</i>	48
<i>hypogrammica</i>	30		<i>behni</i> , Trogon curucui.....	14
<i>mariae</i>	30		Beloperone.....	53
<i>lisettae</i>	30		<i>allenii</i>	55
<i>natunensis</i>	30		<i>Biatorella Kulshanensis</i>	18
<i>nuchalis</i>	30		<i>Bicatillus</i>	41, 43, 45
<i>antisensis</i> , Pharomachrus.....	4		<i>deformis</i>	45
Apaloderma aequatoriale.....	14		<i>extinctiorum</i>	43
<i>narina brachyurum</i>	14		<i>trochiformis</i>	43
<i>littorale</i>	14		<i>bifidus</i> , Epeloria.....	38
<i>narina</i>	14			

<i>bilabiatulus</i> , Pokabius.....	105	<i>chasei</i> , Bouteloua.....	81
<i>bipuncticeps</i> , Arenophilus.....	100	<i>Chilomeniscus</i>	111, 112
<i>blanchardi</i> , Sonora semiannu-		<i>chinensis</i> , Patella.....	41
lata.....	121, 122, 125	<i>Chionactis</i>	109, 111, 112, 122, 123
<i>bolivianus</i> , Trogon.....	14	<i>michoacanensis</i>	113
<i>Boraria</i>	143, 144	<i>occipitalis annulatus</i>	123, 124
<i>carolina</i>	144	<i>klauberi</i>	124
Borthwick, H. A., Photoperiod-		<i>occipitalis</i>	124
ism in relation to the behavior		<i>palarostris</i>	123, 124
of plants and animals.....	vii	<i>chionophila</i> , Linotaenia.....	100
<i>Bothropolys permundus</i>	102	<i>chionurus</i> , Trogon strigilatus.....	6
<i>Bouteloua</i>	77	<i>chiriquina</i> , Lachnosterna.....	137
<i>chasei</i>	81	Phyllophaga.....	130, 137, 139
<i>chondrosioides</i>	80	<i>Chloroceryle americana</i>	48
<i>eludens</i>	80	<i>americana</i>	48
<i>eriopoda</i>	81	<i>cabanisi</i>	48
<i>var. eriostachya</i>	81	<i>hellmayri</i>	48
<i>johnstoni</i>	79, 80	<i>inda chocoensis</i>	47
<i>karwinski</i>	81	<i>inda</i>	47
<i>Brachyiulus pusillus</i>	147	<i>chocoensis</i> , Chloroceryle inda.....	47
<i>brachyurum</i> , Apaloderma nar-		<i>chondrosioides</i> , Bouteloua.....	80
ina.....	14	<i>Chrysemys picta picta</i>	168
<i>Bradypterus luteiventris lute-</i>		<i>chrysochlorus</i> , Trogon.....	11
<i>oventris</i>	71	<i>chrysonotus</i> , Vespertilio.....	2
<i>russulus</i>	71	<i>cinctus</i> , Saltator.....	33
<i>ticehursti</i>	71	<i>cinnamomea</i> , Lachnosterna.....	138
Bray, R. S., Exhibition of the		Phyllophaga.....	130, 138, 139
first American edition of		<i>citreolaemus</i> , Ramphastos.....	169
Buffon.....	vii	<i>citreolus</i> , Trogon.....	7
Exhibition of new books.....	vii, viii, ix	<i>Clypeola</i>	41
<i>Bromus pinetorum</i>	77	<i>corrugata</i>	44
<i>brunnior</i> , Aporiaria.....	37, 40	<i>magellanica</i>	44
<i>Buellia colludens</i>	20	<i>laevis</i>	44
<i>butleri</i> , Seicercus.....	29	<i>clypeolum</i> , Trochita.....	41, 44
<i>Buxbaumia aphylla</i>	vii	<i>coccinea</i> , Certhia.....	70
		<i>Vestitaria</i>	70
		<i>coccineum</i> , Dicaeum cruenta-	
C.....		<i>tum</i>	70
<i>cabanisi</i> , Chloroceryle ameri-		<i>coleoptrata</i> , Scutigera.....	107
<i>cana</i>	48	<i>collaris</i> , Trogon collaris.....	7
<i>caeruleocinctus</i> , Diploilus lon-		<i>collinsi</i> , Seicercus castaneiceps.....	29
<i>dinensis</i>	147	<i>colludens</i> , Buellia.....	20
<i>calcareia</i> , Lecanora.....	20	<i>coloradanus</i> , Guambius.....	104
<i>caligatus</i> , Trogon violaceus.....	13	<i>coloradensis</i> , Conotyla.....	144
<i>Calihulus montanae</i>	146	<i>Nadabius</i>	104
<i>Callogobius</i>	92	<i>columbianus</i> , Trogon.....	13
<i>Calyptra radians</i>	45	<i>concinus</i> , Trogon violaceus.....	13
<i>Calyptraea aurancana</i>	41, 42	<i>conclusa</i> , Sigmoria.....	144
<i>capensis</i>	42	<i>Conepatus</i>	89
<i>castellatus</i>	44	<i>tropicalis trichurus</i>	89, 90
<i>decipiens</i>	44	<i>tropicalis</i>	89, 90
<i>diabloensis</i>	43	<i>yucatanicus</i>	89, 90
<i>extinctorium</i>	45	<i>Coniophanes</i>	112
<i>intermedia</i>	43	<i>conlatus</i> , Polydesmus.....	36, 39
<i>peruviana</i>	42	<i>Conopsis</i>	111, 112
<i>radians</i>	42, 44, 45	<i>Conotyla coloradensis</i>	144
<i>sordida</i>	43	<i>deseretiae</i>	144
<i>trochiformis</i>	42	<i>Contia</i>	109, 111
<i>camerunensis</i> , Heterotrogon vit-		<i>episcopa isozona</i>	117, 118
<i>tatus</i>	15	<i>isozona</i>	120
<i>capensis</i> , Calyptraea.....	42	<i>michoacanensis</i>	113
<i>caraga</i> , Phyllophaga.....	134, 139	<i>taylori</i>	122
<i>carolina</i> , Boraria.....	144	<i>tenuis</i>	111
<i>castaneiceps</i> , Seicercus.....	29	<i>Conus eugrammatus</i>	85
<i>castellatus</i> , Calyptraea.....	44	<i>halitropus</i>	88
<i>centralis</i> , Cryptops.....	98	<i>hammatus</i>	86
<i>centurio</i> , Pokabius.....	105	<i>lividus</i>	86
<i>certanca</i> , Phyllophaga.....	25	<i>maculospira</i>	86
<i>Certhia coccinea</i>	70	<i>obscurus</i>	88
<i>erythronotus</i>	70	<i>planiliratus</i>	86
<i>Chaenotheca phaeocephala</i>	19	<i>quercinus</i>	87
<i>Chamberlin</i> , R. V., On Nine		<i>smirna</i>	87
North American Polydesmoid		<i>spicieri</i>	87
Millipeds.....	35-40	<i>convergens</i> , Arebius.....	105
Some Records and Descrip-		<i>corrugata</i> , Clypeola.....	41
tions of American Chilopods.....	97-108	<i>Trochita</i>	44
Some Records and Descrip-		<i>costaricensis</i> , Baryphthengus	
tions of American Diplo-		<i>martii</i>	48
pods.....	143-152	<i>Pharomachrus mocinno</i>	3

costellata, Trochita.....	43	erythrura, Sonora.....	113
Crucibulum imbricatum.....	45	escabosanus, Gosibius.....	103
verrucosum.....	43	eugrammatus, Conus.....	85
violascens.....	43	Eumeces lynce.....	118
cruentatum, Dicaeum.....	70	euphanum, Zygomierium.....	100, 101
Cryptops centralis.....	98	Eurelus kerensis.....	147
eques.....	98	mulaiki.....	147, 149
culminatus, Ramphastos.....	160	proximus.....	147
cumingii, Anolis.....	117	soleatus.....	147
cupreicauda, Trogon rufus.....	11, 12	Eurycea longicauda guttolin-	
curucui, Trogon.....	9, 14	eata.....	167
Curucujus australis.....	5	Eurymerodesmus dubius.....	38, 40
massena.....	5	schmidtii.....	38, 40
melanurus macrourus.....	6	Eviota.....	92
melanurus.....	5	evotis, Myotis.....	1, 2
cuvieri, Ramphastos.....	155, 156, 157	Vespertilio.....	1, 2
D		exoptatus, Trogon collaria.....	7
Dalquest, Walter W., The Sys-		exspatus, Sigmodon hispidus.....	74
tematic Status of the Races		extinctiorum, Bicatellus.....	45
of the Little Big-Eared Bat		Calyptraea.....	45
Myotis evotis H. Allen.....	1-2	Desmaulus.....	45
Davis, M., Note on change of		F	
nesting date of Australian		fasciculatus, Polyxenus.....	143
Silver Gull in Nat. Zool. Park		festatus, Pharomachrus fulgi-	
decipiens, Calyptraea.....	x	dus.....	4
Trochita.....	41, 44	Ficimia.....	111
deformis, Bicatillus.....	45	ficta, Epeloria.....	39
Deignan, H. G., New Forms of		fictus, Epeloria.....	37
Anthreptes and Seicercus		flavior, Orthoporus.....	148, 149
(Aves) from the Indo-Chinese		flaviostris, Pteroglossus.....	161, 162
Sub-Region.....	29-30	floridanus, Sigmodon hispidus.....	73, 74, 75
Some Early Bird-Records		forficatus, Lithobius.....	104
for Maryland and the Dis-		Fowler, J. A., The fauna of caves	
trict of Columbia.....	69	with particular reference to	
Occurrence of the Hud-		the vertebrates.....	x
sonian Godwit in the District		A New Locality Record for	
of Columbia.....	70	Holbrook's Salamander in	
Two Preoccupied Bird		the District of Columbia.....	167
Names.....	70	Another False Map Turtle	
Hoyt's Horned Lark on the		from the District of Columbia	
Eastern Shore, Maryland.....	71	Vicinity.....	168
deseretae, Conotyla.....	144	fremontus, Arebius.....	106
Desmaulus extinctiorum.....	45	fulgidus, Pharomachrus fulgi-	
diabloensis, Calyptraea.....	43	dus.....	4
Dicaeum cruentatum.....	70	fulva, Linotaenia.....	100
coccineum.....	70	Passerella iliaca.....	163, 164
dicranus, Onthophagus.....	28	fumans, Aporiaria.....	37, 40
Diploptulus londinensis caeruleo-		fusco-rubens, Lecidea.....	19
cinctus.....	147	G	
luscus.....	147	Garrina alicia.....	102
diploonyx, Arebius.....	105, 106	paropoda.....	102
doliis, Arebius.....	107	Geophilus glyptus.....	100
dorothea, Scutigera.....	108	huronius.....	100
dubius, Eurymerodesmus.....	38, 40	phanus.....	99
E		glacialis Staurothele.....	18
Elapomorphus michoacanensis.....	113	gloydi, Sonora semiannulata.....	120, 125
elata, Lecidea.....	19	glyptus, Geophilus.....	100
elenans, Phyllophaga.....	136, 139	Goldman, E. A., A New Skunk	
eludens, Bouteloua.....	80	of the Genus Conepatus from	
elysianus, Arebius.....	106	Mexico.....	89-90
Epeloria bifidus.....	38	Gongylostoma.....	31
ficta.....	39	Gosibius aberrantus.....	103
fictus.....	37	arizonensis.....	103
talapoosa.....	37	escabosanus.....	103
epelus, Arebius.....	105	texicolens.....	103, 104
episcopa, Sonora.....	121	gouldi, Selenidera.....	162
Sonora episcopa.....	121, 122, 125	gracilis, Aphelandra.....	54, 55
episcopum, Lamprosoma.....	121	Otocryptops.....	97
episcopus, Tidesmus.....	35, 39	granulosa, Lecidea goniophila.....	19
eques, Cryptops.....	98	Graphina anguina.....	20
Eremophila alpestris alpestris.....	71	Graptomys pseudogeographica.....	168
hoyti.....	71	grossus, Pitylus.....	54
eriopoda, Bouteloua.....	81	Guambius coloradanus.....	104
eriosstachya, Bouteloua eriopoda.....	81	Guara rubra.....	69
erythronotos, Certhia.....	70	guttolineata, Euryceal longicauda.....	167

Gyrophora vellea.....	20	Infundibulum pileus.....	41
		radicans.....	42
H		innominatus, Ramphastos.....	158
haagi, Phyllophag.....	26, 27	insulicola, Sigmodon hispidus.....	74, 75
haemastica, Limosa.....	70	intermedia, Calyptraea.....	43
halitropus, Conus.....	88	intermedius, Ramphastos sulfu-	
hammatus, Conus.....	86	ratus.....	157
Hasbrouck, E. M., The Euro-		Intonsagobius.....	91, 92
pean Widgeon near Washing-		kuderi.....	92, 93
ton.....	71	iowensis, Nadabius.....	105
helicoida, Trochita.....	44	irrorata, Littorina.....	42
heliotrix, Trogon.....	9	isozona Contia.....	117, 118, 120
hellmayri, Chloroceryle ameri-		Sonora semiannulata.....	119,
cana.....	48	120, 121, 125	
Selenidera.....	162	Ityphilus nemoides.....	99
Herre, A. W. C. T., Two New		savannus.....	99
Species of Lichens and New		Johnson, D. H., Note on pro-	
Records for Washington State		posed new list of mammals	
and North Carolina.....	17-20	of the District of Columbia.....	viii
Notes on Fishes in the		Johnstoni, Bouteloua.....	79, 80
Zoological Museum of Stan-			
ford University. XI. Two		K	
New Genera and Species with		karwinskii, Bouteloua.....	81
Key to the Genera of Gobies		Keith, Mr., Note on crow's nests	
with Vomerine Teeth.....	91-96	in the Dust Bowl area.....	ix
heteronycha, Phyllophaga.....	27	kerensis, Eulelus.....	147
Heterotrogon vittatus camerun-		Kethops atypus.....	97
ensis.....	15	klauberi, Chionactis occipitalis.....	124
vittatus.....	15	kuderi, Intonsagobius.....	92, 93
hispidus, Sigmodon hispidus.....	73	kulshanensis, Biatorella.....	18
Hoffman, I. N., Exhibition of			
publications of Venezuelan		L	
Society of Nat. Hist.....	ix	Lachnosterna chiriquina.....	137
Note on a mockingbird		cinnamomea.....	138
nest.....	99	parilis.....	135
Holitys neomexicanus.....	99	parvisetis.....	134, 135
homa, Scutigera.....	108	rorulenta.....	131
Homaloceranium atrocinctum.....	117	spaethi.....	133
michoacanense.....	113, 116	trinitatus.....	131
hondura, Phyllophaga.....	131, 132, 139	vicina.....	136
hoogstraali, Onthophagus.....	28	lactarium, Spirostrephon.....	145
Phyllophaga.....	21	laevata, Lecanora.....	20
houstoni, Sigmoria.....	144, 149	laevis, Clypeola magellanica.....	44
Howell, Arthur H., A New Red		Lamprosoma annulatum.....	123
Squirrel from Minnesota.....	67-68	episcopum.....	121
Two New Cotton Rats		langsdorffi, Selenidera.....	162
from Florida.....	73-76	Lecidea amylacea.....	19
hoyti, Eremophila alpestris.....	71	elata.....	19
hubbsi, Tidesmus.....	35, 36, 39	fusco-rubens.....	19
hubrichti, Polydesmus.....	37	goniophila f. granulosa.....	19
hudsonicus, Tamiasciurus hud-		granulosa.....	19
sonicus.....	67	myriocarpella.....	19
Humphrey, H. B., Exhibition of		pantherina.....	19
Marie-Victorin's Flore Lau-		speira.....	19
rentienne.....	vii	vulgata.....	19
Note on belligerency of		Lecanora anoptiza.....	20
a mockingbird.....	vii	calcareae.....	20
Note on occurrence of		laevata.....	20
deer and moose in or near		polytropae.....	20
Minneapolis.....	ix	subfusca.....	20
Note on spruces browsed		Leonard, E. C., Three New	
by sheep.....	ix	Acanthaceae from Panama.....	53-56
Naming of a Liberty		Limosa haemastica.....	70
Ship for Hugh M. Smith.....	x	lincei, Scutigera.....	108
huronius, Geophilus.....	100	Lincoln, F. C., Note on abund-	
Hylella azteca.....	49	ance of game birds and mam-	
picta.....	50	mals this year in U. S.....	ix
smaragdina.....	50	The Patuxent Wildlife	
sumichrasti.....	49, 50, 51	Research Refuge.....	ix
hypogrammica, Anthreptes.....	30	linearis, Sonora semiannulata.....	121, 125
I		Sonora miniata.....	121
illaetabilis, Trogon melanoce-		Linotaenia chionophila.....	100
phalus.....	6	fulva.....	100
imbricatum, Crucibulum.....	45	lisetae, Anthreptes.....	80
inca, Ramphastos.....	155, 156, 157	Lithobius forficatus.....	104
inda, Chloroceryle inda.....	47	Little, E. L., A Note on Rafines-	
		que's Florula Columbica.....	57-66

littorale, <i>Apaloderma</i> narina.....	14	<i>Nannodesmus</i>	35
littoralis, <i>Sigmodon</i> hispidus.....	73, 74	<i>Nannolene</i> uta.....	145
Littorina irrorata.....	42	narina, <i>Apaloderma</i> narina.....	14
lividus, <i>Conus</i>	86	nattereri, <i>Selenidera</i>	162
loganus, <i>Lophobius</i>	105	naturensis, <i>Anthreptes</i>	30
<i>Lophobius</i> loganus.....	105	navajo, <i>Arebicus</i>	107
loquax, <i>Tamiasciurus</i> hudsoni- cus.....	67, 68	<i>Ziniulus</i>	146, 149
luscus, <i>Diploilus</i>	147	<i>Nemasoma</i> uta.....	145
luteoventris, <i>Bradypterus</i> luteo- ventris.....	71	nemoides, <i>Ityphilus</i>	99
lynxe, <i>Eumeces</i>	118	nemorensis, <i>Schendyla</i>	98
M		Neolithobius suprenans.....	104
<i>Macrodonogobius</i>	92	neomexicanus, <i>Holitys</i>	99
macrourus, <i>Curucujus</i> melanu- rus.....	6	Nopoiulus minutus.....	145
maculirostris, <i>Selenidera</i>	162	nuchalis, <i>Anthreptes</i>	30
maculospira, <i>Conus</i>	86	Pteroglossus torquatus.....	160, 161
maderensis, <i>Andropogon</i>	82	Numenius americanus ameri- canus.....	69
magellanica, <i>Clypeola</i>	44	<i>Nyctea scandiaca</i>	69
Mangarinus.....	92, 94	O	
waterousi.....	94	oblitus, <i>Ramphastos</i> cuvieri.....	156
Mareca penelope.....	71	obscurus, <i>Conus</i>	88
marginatus, <i>Spirobolus</i>	148	obsoletus, <i>Phytalus</i>	138
mariae, <i>Anthreptes</i> hypogram- maca.....	30	occipitalis, <i>Chionactis</i> occipi- talis.....	124
mariae, <i>Pteroglossus</i>	161, 162	Sonora.....	109
Mars.....	92	odoratus, <i>Sternotherus</i>	168
martinica, <i>Porphyrola</i>	69	oklahomae, <i>Spirobolus</i>	148
massena, <i>Curucujus</i>	5	olivacea, <i>Passerella</i> , iliaca.....	163, 164, 165
McGregorella.....	92	<i>Onthophagus</i> dicerianus.....	28
medianus, <i>Oriulus</i>	146	hoogstraali.....	28
medius, <i>Arebicus</i>	106	oreines, <i>Aniulus</i>	146
megaloporus, <i>Pseudolithobius</i>	104	Oriulus medianus.....	146
melanocephalus, <i>Trogon</i> melan- ocephalus.....	6	<i>Orthoporus</i> flavior.....	148, 149
melanurus, <i>Curucujus</i> melanu- rus.....	5	texicolens.....	148, 149
mesechinus, <i>Nadabius</i>	105	vallicolens.....	149
michoacane, <i>Phyllophaga</i> cava- tus.....	24	Orzyomys.....	73
michoacanense, <i>Homalocranium</i>	113, 116	osculans, <i>Ramphastos</i>	160
michoacanensis, <i>Chionactis</i>	113	Otocryptops gracilis.....	97
Contia.....	113	P	
Elaptomorphus.....	113	pacificus, <i>Myotis</i> evotis.....	2
Scoleophis.....	109, 113, 116	palarostris, <i>Chionactis</i> occipi- talis.....	123, 124
Sonora.....	110, 112, 113, 116, 118, 124	Sonora.....	123
michoacanensis.....	112, 113, 114, 116, 124	pallens, <i>Tamiasciurus</i> hud- sonicus.....	67, 68
<i>Microdesmus</i>	35	pantherina, <i>Lecidea</i>	19
miniata, <i>Sonora</i> miniata.....	120	parilis, <i>Lachnosterna</i>	135
minutissima, <i>Phyllophaga</i>	22	paropoda, <i>Garrina</i>	102
minutus, <i>Nopoiulus</i>	145	parvisetis, <i>Lachnosterna</i>	134, 135
moderata, <i>Taiyna</i>	101	parvisetis, <i>Phyllophaga</i>	130, 132, 139
modocus, <i>Polydesmus</i>	36, 39	<i>Passerella</i> iliaca altivagans.....	164, 165
montanae, <i>Califulus</i>	146	fulva.....	163, 164
montivagus, <i>Arebicus</i>	106	olivacea.....	163, 164, 165
mosaueri, <i>Sonora</i>	119, 125	schistacea.....	163, 164, 165
Muhlenbergia.....	77	unalaschcensis.....	165
pubescens.....	79	<i>Patella</i> chinensis.....	41
pubigluma.....	78	trochoides.....	41, 42
mulaiki, <i>Eurelus</i>	147, 149	trochiformis.....	42, 43
muri, <i>Tamiasciurus</i> hudsonius.....	67	pavoninus, <i>Pharomachrus</i>	4
mutabilis, <i>Sonora</i> michoacanen- sis.....	112, 113, 115, 116, 117, 118, 124	pectoralis, <i>Pteroglossus</i> torqua- tus.....	160
Myersina.....	92	penelope, <i>Mareca</i>	71
Myotis evotis.....	1, 2	permundus, <i>Bothropylus</i>	102
pacificus.....	2	personatus, <i>Trogon</i> personatus.....	8
myriocarpella, <i>Lecidea</i>	19*	peruviana, <i>Calyptura</i>	42
N		Petrides, George, Note on the pileated woodpecker.....	viii
<i>Nadabius</i> coloradensis.....	104	phaeocephala, <i>Chaenotheca</i>	19
iowensis.....	105	phana, <i>Scutigera</i>	108
mesechinus.....	105	phanus, <i>Geophilus</i>	99
<i>Nannaria</i> ursa.....	144, 149	Pharomachrus antisiensis.....	4
		auriceps auriceps.....	4
		fulgidus fulgidus.....	4
		festatus.....	4
		moeinno costaricensis.....	3
		pavoninus.....	4

phleoides, Spirobolus.....	78	pusillus, Brachyulus.....	147
phlyctiphera, Trochita.....	45	Pycnona pujola.....	102
Phyllophaga.....	129		
acapulca.....	135, 139	Q	
aegrota.....	24	quercinus, Conus.....	87
baneta.....	133, 134, 139		
caraga.....	134, 139	R	
cavatus michoacana.....	24	radians, Calyptra.....	45
certanca.....	25	Calyptraea.....	42, 44, 45
chiriquina.....	130, 137, 139	Infundibulum.....	42
cinnamomea.....	130, 138, 139	Trochatella.....	43, 44
elenans.....	136, 139	Trochita.....	41, 42, 45
haagi.....	26, 27	Trochus.....	41, 42
heteronycha.....	27	ramonianus, Trogon violaceus.....	12, 13
hondura.....	131, 132, 139	Ramphastos abbreviatus.....	158, 159
hoogstraali.....	21	ambiguus.....	157, 158
minutissima.....	22	ariel.....	160
parvisetis.....	130, 132, 139	aurantiiostris.....	155
plairi.....	26	citreolaemus.....	159
platti.....	24	culminatus.....	160
poculifer.....	23	cuvieri.....	155, 156, 157
pruinosa.....	22	oblitus.....	156
rorulenta.....	129, 131, 132	inca.....	155, 156, 157
133, 134, 135, 136, 137, 138, 139		innominatus.....	158
spaethi.....	133, 134, 139	osculans.....	160
tancitara.....	23	sulfuratus.....	157
tegenara.....	22	intermedius.....	157
temascaltepeca.....	23	swainsoni.....	158, 159
temaxa.....	135, 139	theresae.....	160
temora.....	131, 135, 139	toco.....	154
tridens.....	28	albugularis.....	154
tridilonycha.....	27, 28	toco.....	154, 155
triniatis.....	132	tucanus.....	155, 156, 157
vicina.....	130, 135, 136, 139	vitellinus.....	160
Phytalus obsoletus.....	138	Rehder, H. A., The Molluscan	
picta, Chrysomys picta.....	168	Genus Trochita Schumacher	
Hylella.....	50	with a Note on Bicatillus	
pileus, Infundibulum.....	41	Swainson.....	41-46
Trochita.....	43, 44	See under Bartsch, Paul.....	85-88
Trochus.....	44	Rhadinæa.....	111
pinetorum, Bromus.....	77	Rhizocarpon ambiguum.....	20
Pitylus grossus.....	34	Rhyodesmus.....	143
Pitylus grossus grossus.....	33	texicolens.....	143
plairi, Phyllophaga.....	26	Richards, H. G., Circling the	
planilifatus, Conus.....	86	Caribbean.....	viii
platti, Phyllophaga.....	24	rorulenta, Ancyronycha.....	131
poculifer, Phyllophaga.....	23	Lachnosterna.....	131
Pokabius bilabiatus.....	105	Phyllophaga.....	129, 131, 132, 133
centurio.....	105	134, 135, 136, 137, 138, 139	
utahensis.....	105	roseigaster, Temnotrogon.....	15
Polydesmus.....	35	rotarium, Zygomermium.....	101
conlatus.....	36, 39	Rubey, W. W., Note on breed-	
hubrichti.....	37	ing of the wood duck near the	
modocus.....	36, 39	reservoir.....	ix
polymorpha, Scolopendra.....	98	rubra, Guara.....	69
polytropa, Lecanora.....	20	Ruella.....	53
Polyxenus fasciculatus.....	143	anthracina.....	53, 54
Porphyryla martinica.....	69	rufescens, Acarospora.....	20
posticus, Theatops.....	97	rufus, Trogon.....	10, 11
Priotelus temnurus temnurus.....	15	Trogon rufus.....	9
vescus.....	15	russulus, Bradypterus luteoven-	
Procinura.....	111	tris.....	71
aemula.....	126		
propinquus, Trogon.....	9	S	
proximus, Eurelus.....	147	saccata, Solorina.....	19
pruinosa, Phyllophaga.....	22	sallaei, Trogon violaceus.....	13, 14
Pseudoficimia.....	111, 112	Saltator.....	33, 34
pseudogeographica, Graptemys.....	168	aurantiiostris.....	34
Pseudolithobius megaloporus.....	104	albicularis.....	33
Pteroglossus azarae.....	161	cinctus.....	33
flaviostris.....	161, 162	Salvadora.....	120
mariae.....	161, 162	saturata, Tribura thoracica.....	71
torquatus nuchalis.....	160, 161	saturatus, Tribura thoracica.....	70
pectoralis.....	160	savannus, Ityphilus.....	99
pubescens, Muhlenbergia.....	78		
publigluma, Muhlenbergia.....	79		
puella, Trogon collaris.....	8		
pujola, Pycnona.....	102		
pulcherrima, Aphelandra.....	55		

- Saylor, L. W., Eight New Mexican Scarab Beetles Collected by the Hoogstraal Expeditions..... 21-28
- Revision of the Rorulentia Group of the Scarab Beetle Genus *Phyllophaga*..... 129-142
- scandiaca*, *Nyctea*..... 69
- Schendyla nemorensis*..... 98
- schmidtii*, *Eurymerodesmus*..... 38, 40
- schistacea*, *Passerella iliaca*..... 163, 164, 165
- Scolecophis*..... 109, 110, 111, 112
- atrocinctus*..... 109, 117, 118
- michocanensis*..... 109, 113, 116
- Scolopendra polymorpha*..... 98
- viridis*..... 98
- scoparius*, *Andropogon*..... 83
- scotti*, *Spirobolus*..... 149
- Scutigera coleoptrata*..... 107
- dorothea*..... 108
- homa*..... 108
- lincei*..... 108
- phana*..... 108
- Scytonotus amandus*..... 143
- Seicercus annamensis*..... 29
- butleri*..... 29
- castaneiceps*..... 29
- collinsi*..... 29
- sinensis*..... 29
- stresemanni*..... 29
- Selenidera gouldi*..... 162
- hellmayri*..... 162
- landsdorffi*..... 162
- maculirostris*..... 162
- nattereri*..... 162
- semiannulata*, *Sonora*..... 109
- 110, 112, 113, 118, 119, 125
- semirufus*, *Baryphthengus martii*..... 48
- sigapatella*..... 42
- Sigmodon hispidus exsputus*..... 74
- floridanus*..... 73, 74, 75
- hispidus*..... 73
- insulicola*..... 74, 75
- littoralis*..... 73, 74
- spadicipygus*..... 74
- Sigmoria conclusa*..... 144
- houstoni*..... 144, 149
- sinensis*, *Seicercus*..... 29
- smaragdina*, *Hylella*..... 50
- Smilogobius*..... 93
- smirna*, *Conus*..... 87
- soleatus*, *Eurelus*..... 147
- Solorina saccata*..... 19
- Sonora*..... 109, 110, 111, 112, 123
- episcopa*..... 121
- episcopa*..... 121, 122, 125
- taylori*..... 122, 124
- erythura*..... 113
- michoacanensis*..... 109, 110
- 112, 113, 116, 118, 124
- michoacanensis*..... 112
- 113, 114, 116, 124
- mutabilis*..... 112
- 113, 115, 116, 117, 118, 124
- miniata linearis*..... 121
- miniata*..... 120
- mosaueri*..... 119, 125
- occipitalis*..... 109
- palarostris*..... 123
- semiannulata*..... 109, 110, 112, 113, 118
- blanchardi*..... 121, 122, 125
- gloydi*..... 120, 125
- isozona*..... 119, 120, 121, 125
- linearis*..... 121, 125
- semiannulata*..... 119, 125
- sordida*, *Calyptraea*..... 43
- spadicus*, *Andropogon*..... 82
- spadicipygus*, *Sigmodon hispidus*..... 74
- spaethi*, *Lachnosterna*..... 133
- Phyllophaga*..... 133, 134, 139
- speira*, *Lecidea*..... 19
- spiceri*, *Conus*..... 87
- spiciformes*, *Spirobolus*..... 78
- spiralis*, *Trochita*..... 41, 42
- Spirostrephon lactarium*..... 145
- tensexense*..... 145
- Staurolthele glacialis*..... 18
- Sternotherus odoratus*..... 168
- Stenorhina*..... 111
- Stickel, W. H., The Mexican Snakes of the Genera *Sonora* and *Chionactis* with Notes on the Status of Other Colubrid Genera..... 109-128
- Stipia*..... 77
- alta*..... 79
- stresemanni*, *Seicercus*..... 29
- strigilatus*, *Trogon strigilatus*..... 6
- subfusca*, *Lecanora*..... 20
- submontanus*, *Trogon temperatus*..... 8
- sulfuratus*, *Ramphastos*..... 157
- sulphureus*, *Trogon*..... 10
- Trogon rufus*..... 10
- sumichrasti*, *Hylella*..... 49, 50, 51
- suprenans*, *Neolithobius*..... 104
- swainsoni*, *Ramphastos*..... 158, 159
- Swallen, J. R., Nine New Grasses from Mexico..... 77-84
- T
- Taiyna moderata*..... 101
- talapoosa*, *Epeloria*..... 37
- Tamiasciurus hudsonicus*..... 67
- sonicus*..... 67, 68
- loquax*..... 67, 68
- murii*..... 67, 68
- pallescens*..... 23
- tancitara*, *Phyllophaga*..... 110, 111, 112
- Tantilla*..... 110, 111, 112
- Taylor, E. H., A New Hylella from Mexico*..... 49-52
- taylori*, *Contia*..... 122
- Sonora episcopa*..... 122, 124
- tegenara*, *Phyllophaga*..... 22
- temascaltepeca*, *Phyllophaga*..... 23
- temaxa*, *Phyllophaga*..... 135, 139
- Temnotrogon roseigaster*..... 15
- temnurus*, *Priotelus temnurus*..... 15
- temora*, *Phyllophaga*..... 131, 135, 139
- temperatus*, *Rogon temperatus*..... 8, 9
- tenellus*, *Trogon rufus*..... 12
- tenuis*, *Contia*..... 111
- tetonus*, *Arebius*..... 107
- Tetrentodon*..... 31
- tensexense*, *Spirostrephon*..... 145
- texicolens*, *Aporiaria*..... 143
- texicolens*, *Gosibius*..... 103, 104
- Orthoporus*..... 148, 149
- Rhysodesmus*..... 143
- Theatops posticus*..... 97
- theresae*, *Ramphastos*..... 160
- Thone, Frank, Exhibition of new books*..... vii, ix
- Note on Progress in dehydration of foods..... viii
- ticehursti*, *Bradypterus luteiventris*..... 71
- Tidabius tivius*..... 104
- Tidesmus*..... 35
- episcopus*..... 35, 39
- hubbsi*..... 35, 36, 39
- Tingupa utahensis*..... 144
- tivius*, *Tibabius*..... 104
- toco*, *Ramphastos*..... 154
- Todd, W. E. C., Critical Remarks on the Trogons*..... 3-16

Todd, W. E. C., Two New Birds from Tropical America.....	47-48	yucatanus, Ramphastos.....	155, 156, 157
Critical Remarks on the		U	
Toucans.....	153-162	umbraticus, Arctogeophilus.....	101
Toluca.....	111, 112	unalaschensis, Passerella iliaca	165
<i>Torrecopsis bacillaris</i>	31	underwoodi, Trogon aurantiiventris.....	8
Townes, H. K., A dictionary's misconceptions about entomology.....	x	Urocoptis bacillaris.....	31
Tribuna thoracica saturata.....	71	ursa, Nannaria.....	144, 149
luteoventris saturatus.....	70	uta, Nannolene.....	145
trichurus, Conepatus tropicalis.....	89, 90	uta, Nemasoma.....	145
tridens, Arebius.....	107	utahensis, Pokabius.....	105
Phyllophaga.....	28	Tingupa.....	144
tridilonycha, Phyllophaga.....	27, 28	Utoiulus.....	145
Trimorphodon.....	111	utus.....	145, 149
trinitatis, Lachnosterna.....	131	utus, Utoiulus.....	145, 149
Phyllophaga.....	132	V	
Trochatella.....	41	vallicolens, Orthoporus.....	149
radians.....	43, 44	vellea, Gyrophora.....	20
trochiformis, Biatillus.....	43	ventricosa, Trochita.....	43
Calyptraea.....	42	verrucosum, Crucibulum.....	43
Patella.....	42, 43	vescus, Priotelus temnurus.....	15
Trochita.....	43	Vespertilio chrysonotus.....	2
Trochilla.....	41	evotis.....	1, 2
Trochita.....	41	Vestitaria coccinea.....	70
clypeolum.....	41, 44	vicina, Lachnosterna.....	136
corrugata.....	44	Phyllophaga.....	130, 135, 136, 139
costellata.....	43	violaceus, Trogon violaceus.....	12, 13
decipiens.....	41, 44	violascens, Crucibulum.....	43
helicoida.....	44	virginialis, Trogon collaris.....	98
phlyctiphera.....	45	viridis, Scolopendra.....	98
pileus.....	43, 44	vitellinus, Ramphastos.....	160
radians.....	41, 42, 45	vittatus, Heterotrogon vittatus.....	15
spiralis.....	41, 42	Vogt, W., A thousand days with ten million birds.....	viii
trochiformis.....	43	vulgata, Lecidea.....	19
ventricosa.....	43	W	
trochoides, Patella.....	41, 42	Wade, J. S., Exhibition of new books.....	viii, ix
Trochus pileus.....	44	Waite, M. B., Winter habits of mammals near Washington.....	vii
radians.....	41, 42	Notes on mammals and birds near Washington.....	vii
Trogon ambiguus ambiguus.....	7	Exhibition of specimens of Buxbaumia aphylla.....	vii
aurantiventris underwoodi.....	8	Report of finding two scarce mosses.....	viii
bairdi.....	6	Note on damage done to farm products by crows and goldfinches.....	ix
bolivianus.....	14	waterousi, Mangarinus.....	94
chrysochlorus.....	11	Weber, W., A collecting trip to southern Mexico.....	ix
citreolus.....	7	Wetmore, A., Note on scarcity of winter birds at Plummers Island.....	vii
collaris collaris.....	7	Note on a possible migration route across the Yucatan Channel.....	x
exoptatus.....	7	X	
puella.....	8	xenoporus, Arctogeophilus.....	102
virginalis.....	8	Y	
columbianus.....	13	yucatanicus, Conepatus tropicalis.....	89, 90
curucui.....	9, 14	Z	
behni.....	14	Zegalerus.....	42
elegans australis.....	7	Zimmer, John T., A New Species of Finch from Ecuador.....	33-34
heliothrix.....	9	Ziniulus navajo.....	146, 149
melanocephalus illaetabilis.....	6	Zygomerium.....	100
melanocephalus.....	6	euphanum.....	100, 101
personatus personatus.....	8	rotarium.....	101
propinquus.....	9		
rufus.....	10, 11		
amazonicus.....	11		
cupreicauda.....	11, 12		
rufus.....	9		
sulphureus.....	10		
tenellus.....	12		
strigilatus chionurus.....	6		
strigilatus.....	6		
sulphureus.....	10		
temperatus submontanus.....	8		
temperatus.....	8, 9		
violaceus caligatus.....	13		
concinus.....	13		
ramonius.....	12, 13		
sallaei.....	13, 14		
violaceus.....	12, 13		
tropicalis, Conepatus tropicalis.....	89, 90		
Truitt, R. D., Note on nesting of pileated woodpecker in Patuxent Swamp.....			